Allen-Bradley

Technical Data

PowerFlex® 70 AC Drives

Allen-Bradley
RELIANCE ELECTRIC
DODGE
ROCKWELL SOFTWARE

Rockwell Automation

Bringing Together Leading Brands in Industrial Automation

PowerFlex® 70 AC Drive Technical Data

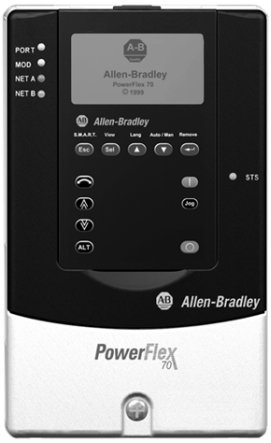
Optimized Simplicity

PowerFlex® 70 drives are designed to worldwide standards and ratings, allowing out-of-the-box performance around the globe. Available ratings include: 0.5 to 10 HP output at 240V AC input, 0.5 to 20 HP output at 480V AC input, 0.5 to 20 HP output at 600V AC input.

The PowerFlex 70 drive can be used with a cost effective LED Human Interface Module or a fuller featured LCD version, which provides multilingual test for startup, metering, programming and troubleshooting.

The PowerFlex 70 can be programmed for either Volts per Hertz or Sensorless Vector Control to cover a wide range of applications from fans to extruders.

Optional internal communication modules provide fast and efficient control and/or data exchange with host controllers over popular interfaces. These interfaces include: DeviceNet™, EtherNet, ControlNet™, Remote I/O, Serial Communications and other open control and communication networks. PC tools such as DriveExplorer™ and DriveTools™ 2000 assist with programming, monitoring, and troubleshooting the PowerFlex 70.



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Product Overview

Flexible Packaging and Mounting

IP20, NEMA Type 1 – For conventional mounting inside or outside a control cabinet. Conduit plate is vertically removable for easy installation and replacement without disturbing conduit.

IP66, NEMA Type 4X/12 (Indoor Use) – For mounting directly in the production environment. Listed by UL to resist dust, dirt, etc. and to survive high pressure water spray. Also certified by NSF to assure conformity with international food equipment standards.

Flange Type – For mounting heatsink through back of an enclosure, thus removing a large portion of the heat inside a cabinet. The backside is rated IP66 and UL (NEMA) Type 4X/12 for both indoor and outdoor use.

Space Saving Hardware Features

Zero Stacking™ - Drives can be mounted directly next to one another with no reduction of ambient temperature rating (50˚ C).

Integral EMC Filtering provides a compact, all-in-one package solution for meeting EMC requirements, including CE in Europe.

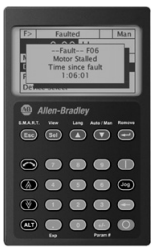
Integral Dynamic Brake Transistor delivers a cost-effective means of switching regenerative energy without costly external chopper circuits.

Internal Dynamic Brake Resistor requires no extra panel space, and supplies a large amount of braking torque for short periods.

Easy to Use Human Interface Tools

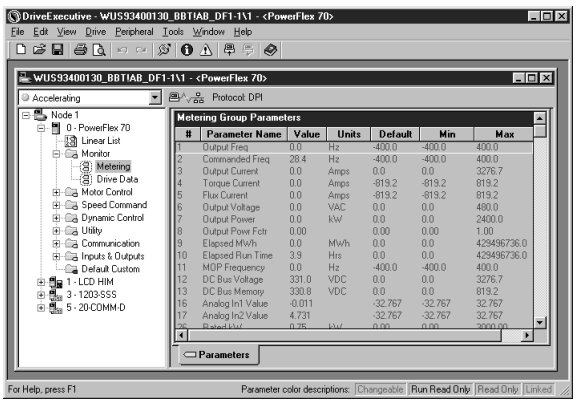
PowerFlex 7-Class LCD Human Interface Modules provide:

- Large and easy to read 7 line backlit display
- Variety of languages (English, French, German, Italian, Spanish, Portuguese, Dutch)
- Alternate function keys for shortcuts to common tasks
- “Calculator-like” number pad for fast and easy data entry (Full Numeric version only)
- Control keys for local start, stop, speed, and direction
- Remote versions for panel mount applications



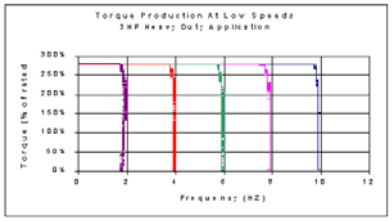
Family of PC based configuration tools

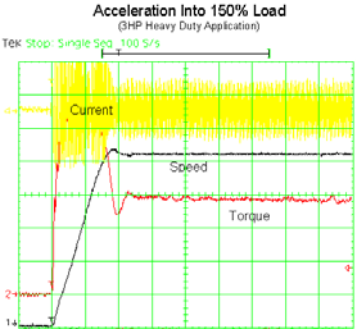
- **DriveExplorer and DriveExplorer Lite**: a simple and flexible “On-line” tool for monitoring and configuration while connected to a drive.
- **DriveExecutive™**: A flexible, yet very friendly “On-line” and “Off-line” tool, for monitoring and configuration while connected or disconnected to a drive.


DriveExecutive - WUS93400130_BBTIAB_DF1-1\1 - <PowerFlex 70>
File Edit View Drive Peripheral Tools Window Help
WUS93400130_BBTIAB_DF1-1\1 - <PowerFlex 70>
Accelerating
Protocol: DPI
Node 1
0 - PowerFlex 70
Linear List
Monitor
Metering
Drive Data
Motor Control
Speed Command
Dynamic Control
Utility
Communication
Inputs & Outputs
Default Custom
1 - LCD HIM
3 - 1203-SSS
5 - 20-COMM-D
Metering Group Parameters
Parameter Name Value Units Default Min Max
1 Output Freq 0.0 Hz -400.0 -400.0 400.0
2 Commanded Freq 28.4 Hz -400.0 -400.0 400.0
3 Output Current 0.0 Amps 0.0 0.0 3276.7
4 Torque Current 0.0 Amps -819.2 -819.2 819.2
5 Flux Current 0.0 Amps -819.2 -819.2 819.2
6 Output Voltage 0.0 VAC 0.0 0.0 480.0
7 Output Power 0.0 kW 0.0 0.0 2400.0
8 Output Powr Fctr 0.00 0.00 0.00 1.00
9 Elapsed MWh 0.0 MWh 0.0 0.0 429496736.0
10 Elapsed Run Time 3.9 Hrs 0.0 0.0 429496736.0
11 MOP Frequency 0.0 Hz -400.0 -400.0 400.0
12 DC Bus Voltage 331.0 VDC 0.0 0.0 3276.7
13 DC Bus Memory 330.8 VDC 0.0 0.0 819.2
16 Analog In1 Value -0.011 -32.767 -32.767 32.767
17 Analog In2 Value 4.731 -32.767 -32.767 32.767
Parameters
For Help, press F1
Parameter color descriptions: Changeable Run Read Only Read Only Linked

Product Overview

Control and Performance Features





Sensorless Vector Control develops high torque over a wide speed range, and adapts to individual motor characteristics.

Fast acting **Current Limit** and **Bus Voltage Regulation** result in maximum acceleration and deceleration without tripping.

Flying Start delivers smooth connection into rotating loads, regardless of commanded direction, without the need for any speed feedback device.

PI Control can eliminate the need for a separate process loop controller.

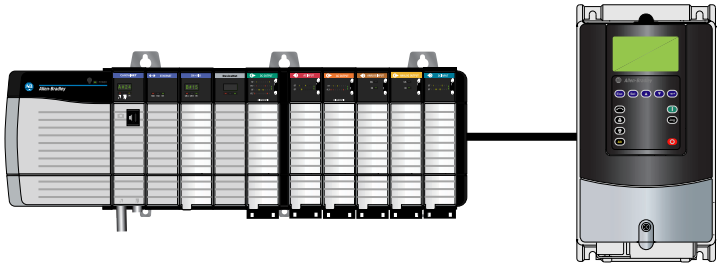
Inertia Ride-Through offers tripless operation during a prolonged power outage by using the rotating energy stored in high inertia, low friction loads.

User Sets, allowing up to three complete sets of parameter data, can be individually loaded for different batch processes.

Slip compensation delivers minimum of 0.5% open loop speed regulation across a wide speed range, eliminating the need for speed feedback devices in some applications.

Unsurpassed Capability in Network Communications

PowerFlex 70 drives are fully compatible with Allen-Bradley drive's wide variety of DPI communication adapters, offering the following benefits:



DeviceNet	ControlNet	EtherNet/IP	Remote I/O	RS-485 DF1	Profibus	Interbus-S	
✔	✔	✔					**(Unconnected Messaging)** permits other network devices (e.g. PanelView) to communicate directly to a drive without routing the communication through the network scanner.
✔	✔	✔		✔			**Adapter Routing** -- Plug PC into one drive and talk to other Allen-Bradley drives on same network, without being routed through the network scanner.
✔	✔	✔	✔	✔	✔	✔	**Access to 100% of all parameters** over the network.
✔		✔			✔		**AutoBaud** capability makes initial connections less problematic.
✔							**Change Of State** significantly reduces network traffic by configuring control messages to be sent only upon customer defined states. Very flexible configuration for each node (Example: "reference must change by more than 5%").
✔		✔					**Peer Control** provides master slave type control between drives, where one or more slave drives (consumers) can run based on the status of a master drive (producer), which can also significantly reduce network traffic.
✔							**ADR (Automatic Device Replacement)** saves significant time and effort when replacing a drive, by allowing the scanner to be configured to automatically detect a new drive and download the required parameter settings.
✔	✔	✔	✔	✔	✔	✔	**Flexible Fault Configuration** – Adapters can be programmed to take fault based actions such as ramp to stop, cost to stop, and hold last state, as well as send user configurable logic control and speed reference values. In addition, different actions can be taken based on whether the network experienced a serious problem (broken cable etc.) versus a network idle condition (PLC set to "Program").

Catalog Number Explanation

20A	B	2P1	A	1	A	Y	Y	N	N	N	N
Drive	Voltage Rating	Rating	Enclosure	HIM (1)	Documentation (2)	Brake IGBT	Brake Resistor	Emission Class	Comm Slot		

Code	Type
20A	70
20B	700

Code	Voltage	Ph.
B	240V AC	3
C	400V AC	3
D	480V AC	3
E	600V AC	3

Code	Type
A	English Manual
P	Portuguese Manual
S	Spanish Manual
N	No Manual

Code	w/Brake Resistor
Y	Yes
N	No

Code	w/Brake IGBT
Y	Yes

Code	Version
C	ControlNet (Coax)
D	DeviceNet
E	EtherNet/IP
H	RS485 HVAC
R	RIO
S	RS485 DF-1
N	N/A

Code	Interface Module
0	Blank HIM
1	Digital LED HIM
2	Digital LCD HIM
3	Full Numeric LCD HIM
4	Analog LCD HIM
5	Prog. Only LCD HIM

Code	Rating
A	Filtered (Excluding 600V AC)
	A(3) & B Frames (Optional)
	C & D Frames (Standard)
N	Not Filtered
	A & B Frames (Optional)
	C & D Frames NA (600V AC only)

Code	Enclosure
A	Panel Mount - IP 20, NEMA Type 1
C	Wall/Machine Mount = IP66, NEMA 4X/12 (Indoor Use)
F	Flange Mount - Front = IP 20, NEMA Type 1; Heatsink = IP66, NEMA Type 4X/12

(1) IP66, NEMA 4X/12 (Code C) is available only with Full Numeric LCD HIM (Code 3).
(2) All drives ship with multilingual Quick Starts.
(3) Increases A Frame size to B.

Output Current @ 600V 60Hz Input			Output Current @ 480V 60Hz Input			Output Current @ 400V 50Hz Input			Output Current @ 240V 60Hz Input			Output Current @ 208V 60Hz Input		
Code	Amps	kW (HP)	Code	Amps	kW (HP)	Code	Amps	kW (HP)	Code	Amps	kW (HP)	Code	Amps	kW (HP)
0P9	0.9	0.37 (0.5)	1P1	1.1	0.37 (0.5)	1P3	1.3	0.37 (0.5)	2P2	2.2	0.37 (0.5)	2P2	2.5	0.37 (0.5)
1P7	1.7	0.75 (1.0)	2P1	2.1	0.75 (1.0)	2P1	2.1	0.75 (1.0)	4P2	4.2	0.75 (1.0)	4P2	4.8	0.75 (1.0)
2P7	2.7	1.5 (2.0)	3P4	3.4	1.5 (2.0)	3P5	3.5	1.5 (2.0)	6P8	6.8	1.5 (2.0)	6P8	7.8	1.5 (2.0)
3P9	3.9	2.2 (3.0)	5P0	5.0	2.2 (3.0)	5P0	5.0	2.2 (3.0)	9P6	9.6	2.2 (3.0)	9P6	11	2.2 (3.0)
6P1	6.1	4.0 (5.0)	8P0	8.0	3.7 (5.0)	8P7	8.7	4.0 (5.0)	015	15.3	4.0 (5.0)	015	17.5	4.0 (5.0)
9P0	9.0	5.5 (7.5)	011	11	5.5 (7.5)	011	11.5	5.5 (7.5)	022	22	5.5 (7.5)	022	25.3	5.5 (7.5)
011	11	7.5 (10)	014	14	7.5 (10)	015	15.4	7.5 (10)	028	28	7.5 (10)	028	32.2	7.5 (10)
017	17	11 (15)	022	22	11 (15)	022	22	11 (15)						
022	22	15 (20)	027	27	15 (20)	030	30	15 (20)						

PowerFlex 70 Drives — Panel Mount - IP 20, NEMA Type 1

200-240V AC, Three-Phase Drives (For pricing information, refer to the PowerFlex 70 Price List, Publication 20A-PL001…)

Output Amps						Nominal Power Ratings				IP20, NEMA Type 1 without HIM	
240V AC Input			208V AC Input			Normal Duty		Heavy Duty		Catalog Number	
Cont.	1 Min.	3 Sec.	Cont.	1 Min.	3 Sec.	kW	HP	kW	HP	*20A…*	Frame Size
2.2	2.4	3.3	2.5	2.7	3.7	0.37	0.5	0.25	0.33	B2P2A0AYNNNNN	A
4.2	4.8	6.4	4.8	5.5	7.4	0.75	1	0.55	0.75	B4P2A0AYNNNNN	A
6.8	9	12	7.8	10.3	13.8	1.5	2	1.1	1.5	B6P8A0AYNNNNN	B
9.6	10.6	14.4	11	12.1	16.5	2.2	3	1.5	2	B9P6A0AYNNNNN	B
15.3	17.4	23.2	17.5	19.2	26.2	4	5	3	3	B015A0AYNANNN	C
22	24.2	33	25.3	27.8	37.9	5.5	7.5	4	5	B022A0AYNANNN	D
28	33	44	32.2	37.9	50.6	7.5	10	5.5	7.5	B028A0AYNANNN	D

380-480V AC, Three-Phase Drives (For pricing information, refer to the PowerFlex 70 Price List, Publication 20A-PL001…)

Output Amps						Nominal Power Ratings				IP20, NEMA Type 1 without HIM	
480V AC Input ❶			380-400V AC Input			Normal Duty		Heavy Duty		Catalog Number	
Cont.	1 Min.	3 Sec.	Cont.	1 Min.	3 Sec.	kW	HP	kW	HP	*20A…*	Frame Size
1.1	1.2	1.6	1.3	1.4	1.9	0.37	0.5	0.25	0.33	D1P1A0AYNNNNN	A
2.1	2.4	3.2	2.1	2.4	3.2	0.75	1	0.55	0.75	D2P1A0AYNNNNN	A
3.4	4.5	6	3.5	4.5	6	1.5	2	1.1	1.5	D3P4A0AYNNNNN	A
5	5.5	7.5	5	5.5	7.5	2.2	3	1.5	2	D5P0A0AYNNNNN	B
8	8.8	12	8.7	9.9	13.2	4	5	3	3	D8P0A0AYNNNNN	B
11	12.1	16.5	11.5	13	17.4	5.5	7.5	4	5	D011A0AYNANNN	C
14	16.5	22	15.4	17.2	23.1	7.5	10	5.5	7.5	D014A0AYNANNN	C
22	24.2	33	22	24.2	33	11	15	7.5	10	D022A0AYNANNN	D
27	33	44	30	33	45	15	20	11	15	D027A0AYNANNN	D

500-600V AC, Three-Phase Drives (For pricing information, refer to the PowerFlex 70 Price List, Publication 20A-PL001…)

Output Amps			Nominal Power Ratings				IP20, NEMA Type 1 without HIM	
600V AC Input			Normal Duty		Heavy Duty		Catalog Number	
Cont.	1 Min.	3 Sec.	kW	HP	kW	HP	*20A…*	Frame Size
0.9	1	1.4	0.37	0.5	0.25	0.33	E0P9A0AYNNNNN	A
1.7	1.9	2.6	0.75	1	0.55	0.75	E1P7A0AYNNNNN	A
2.7	3.6	4.8	1.5	2	1.1	1	E2P7A0AYNNNNN	A
3.9	4.3	5.8	2.2	3	1.5	1.5	E3P9A0AYNNNNN	B
6.1	6.7	9.1	4	5	3	3	E6P1A0AYNNNNN	B
9	9.9	13.5	5.5	7.5	4	5	E9P0A0AYNNNNN	C
11	13.5	18	7.5	10	5.5	7.5	E011A0AYNNNNN	C
17	18.7	25.5	11	15	7.5	10	E017A0AYNNNNN	D
22	25.5	34	15	20	11	15	E022A0AYNNNNN	D

❶ Catalog code corresponds to output amps in these columns. Drive must be programmed to lower voltage to obtain higher currents shown at right.

PowerFlex 70 Drives — Wall / Machine Mount - IP 66, NEMA Type 4X/12 (Indoor Use)

200-240V AC, Three-Phase Drives (For pricing information, refer to the PowerFlex 70 Price List, Publication 20A-PL001…)

Output Amps						Nominal Power Ratings				IP66, NEMA Type 4X/12 with HIM	
240V AC Input			208V AC Input			Normal Duty		Heavy Duty		Catalog Number	
Cont.	1 Min.	3 Sec.	Cont.	1 Min.	3 Sec.	kW	HP	kW	HP	*20A…*	Frame Size
2.2	2.4	3.3	2.5	2.7	3.7	0.37	0.5	0.25	0.33	B2P2C3AYNNNNN	B
4.2	4.8	6.4	4.8	5.5	7.4	0.75	1	0.55	0.75	B4P2C3AYNNNNN	B
6.8	9	12	7.8	10.3	13.8	1.5	2	1.1	1.5	B6P8C3AYNNNNN	B
9.6	10.6	14.4	11	12.1	16.5	2.2	3	1.5	2	B9P6C3AYNNNNN	B
15.3	17.4	23.2	17.5	19.2	26.2	4	5	3	3	B015C3AYNANNN	D
22	24.2	33	25.3	27.8	37.9	5.5	7.5	4	5	B022C3AYNANNN	D
28	33	44	32.2	37.9	50.6	7.5	10	5.5	7.5	B028C3AYNANNN	D

380-480V AC, Three-Phase Drives (For pricing information, refer to the PowerFlex 70 Price List, Publication 20A-PL001…)

Output Amps						Nominal Power Ratings				IP66, NEMA Type 4X/12 with HIM	
480V AC Input ❶			380-400V AC Input			Normal Duty		Heavy Duty		Catalog Number	
Cont.	1 Min.	3 Sec.	Cont.	1 Min.	3 Sec.	kW	HP	kW	HP	*20A…*	Frame Size
1.1	1.2	1.6	1.3	1.4	1.9	0.37	0.5	0.25	0.33	D1P1C3AYNNNNN	B
2.1	2.4	3.2	2.1	2.4	3.2	0.75	1	0.55	0.75	D2P1C3AYNNNNN	B
3.4	4.5	6	3.5	4.5	6	1.5	2	1.1	1.5	D3P4C3AYNNNNN	B
5	5.5	7.5	5	5.5	7.5	2.2	3	1.5	2	D5P0C3AYNNNNN	B
8	8.8	12	8.7	9.9	13.2	4	5	3	3	D8P0C3AYNNNNN	B
11	12.1	16.5	11.5	13	17.4	5.5	7.5	4	5	D011C3AYNANNN	D
14	16.5	22	15.4	17.2	23.1	7.5	10	5.5	7.5	D014C3AYNANNN	D
22	24.2	33	22	24.2	33	11	15	7.5	10	D022C3AYNANNN	D
27	33	44	30	33	45	15	20	11	15	D027C3AYNANNN	D

500-600V AC, Three-Phase Drives (For pricing information, refer to the PowerFlex 70 Price List, Publication 20A-PL001…)

Output Amps			Nominal Power Ratings				IP66/NEMA Type 4X/12 with HIM	
600V AC Input			Normal Duty		Heavy Duty		Catalog Number	
Cont.	1 Min.	3 Sec.	kW	HP	kW	HP	*20A…*	Frame Size
0.9	1	1.4	0.37	0.5	0.25	0.33	E0P9C3AYNNNNN	B
1.7	1.9	2.6	0.75	1	0.55	0.75	E1P7C3AYNNNNN	B
2.7	3.6	4.8	1.5	2	1.1	1	E2P7C3AYNNNNN	B
3.9	4.3	5.8	2.2	3	1.5	1.5	E3P9C3AYNNNNN	B
6.1	6.7	9.1	4	5	3	3	E6P1C3AYNNNNN	B
9	9.9	13.5	5.5	7.5	4	5	E9P0C3AYNNNNN	D
11	13.5	18	7.5	10	5.5	7.5	E011C3AYNNNNN	D
17	18.7	25.5	11	15	7.5	10	E017C3AYNNNNN	D
22	25.5	34	15	20	11	15	E022C3AYNNNNN	D

❶ Catalog code corresponds to output amps in these columns. Drive must be programmed to lower voltage to obtain higher currents shown at right.

Product Selection Guide

PowerFlex 70 Drives — Flange Mount ❶ - Front Chassis = IP 20, NEMA Type 1; Heatsink = IP 66, NEMA Type 4X/12

200-240V AC, Three-Phase Drives (For pricing information, refer to the PowerFlex 70 Price List, Publication 20A-PL001…)

Output Amps						Nominal Power Ratings				Flange Type without HIM	
240V AC Input			208V AC Input			Normal Duty		Heavy Duty		Catalog Number *20A…*	Frame Size
Cont.	1 Min.	3 Sec.	Cont.	1 Min.	3 Sec.	kW	HP	kW	HP		
2.2	2.4	3.3	2.5	2.7	3.7	0.37	0.5	0.25	0.33	B2P2F0AYNNNNN	A
4.2	4.8	6.4	4.8	5.5	7.4	0.75	1	0.55	0.75	B4P2F0AYNNNNN	A
6.8	9	12	7.8	10.3	13.8	1.5	2	1.1	1.5	B6P8F0AYNNNNN	B
9.6	10.6	14.4	11	12.1	16.5	2.2	3	1.5	2	B9P6F0AYNNNNN	B
15.3	17.4	23.2	17.5	19.2	26.2	4	5	3	3	B015F0AYNANNN	C
22	24.2	33	25.3	27.8	37.9	5.5	7.5	4	5	B022F0AYNANNN	D
28	33	44	32.2	37.9	50.6	7.5	10	5.5	7.5	B028F0AYNANNN	D

380-480V AC, Three-Phase Drives (For pricing information, refer to the PowerFlex 70 Price List, Publication 20A-PL001…)

Output Amps						Nominal Power Ratings				Flange Type without HIM	
480V AC Input ❷			380-400V AC Input			Normal Duty		Heavy Duty		Catalog Number *20A…*	Frame Size
Cont.	1 Min.	3 Sec.	Cont.	1 Min.	3 Sec.	kW	HP	kW	HP		
1.1	1.2	1.6	1.3	1.4	1.9	0.37	0.5	0.25	0.33	D1P1F0AYNNNNN	A
2.1	2.4	3.2	2.1	2.4	3.2	0.75	1	0.55	0.75	D2P1F0AYNNNNN	A
3.4	4.5	6	3.5	4.5	6	1.5	2	1.1	1.5	D3P4F0AYNNNNN	A
5	5.5	7.5	5	5.5	7.5	2.2	3	1.5	2	D5P0F0AYNNNNN	B
8	8.8	12	8.7	9.9	13.2	4	5	3	3	D8P0F0AYNNNNN	B
11	12.1	16.5	11.5	13	17.4	5.5	7.5	4	5	D011F0AYNANNN	C
14	16.5	22	15.4	17.2	23.1	7.5	10	5.5	7.5	D014F0AYNANNN	C
22	24.2	33	22	24.2	33	11	15	7.5	10	D022F0AYNANNN	D
27	33	44	30	33	45	15	20	11	15	D027F0AYNANNN	D

500-600V AC, Three-Phase Drives (For pricing information, refer to the PowerFlex 70 Price List, Publication 20A-PL001…)

Output Amps			Nominal Power Ratings				Flange Type without HIM	
600V AC Input			Normal Duty		Heavy Duty		Catalog Number *20A…*	Frame Size
Cont.	1 Min.	3 Sec.	kW	HP	kW	HP		
0.9	1	1.4	0.37	0.5	0.25	0.33	E0P9F0AYNNNNN	A
1.7	1.9	2.6	0.75	1	0.55	0.75	E1P7F0AYNNNNN	A
2.7	3.6	4.8	1.5	2	1.1	1	E2P7F0AYNNNNN	A
3.9	4.3	5.8	2.2	3	1.5	1.5	E3P9F0AYNNNNN	B
6.1	6.7	9.1	4	5	3	3	E6P1F0AYNNNNN	B
9	9.9	13.5	5.5	7.5	4	5	E9P0F0AYNNNNN	C
11	13.5	18	7.5	10	5.5	7.5	E011F0AYNNNNN	C
17	18.7	25.5	11	15	7.5	10	E017F0AYNNNNN	D
22	25.5	34	15	20	11	15	E022F0AYNNNNN	D

❶ Provides a method for heatsink to be external to customer enclosure. Front chassis = IP20, NEMA Type 1; Rear Heatsink = IP66 UL Type 4X/12 for indoor/outdoor use.

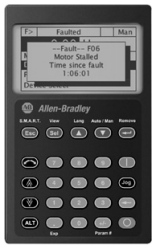
❷ Catalog code corresponds to output amps in these columns. Drive must be programmed to lower voltage to obtain higher currents shown at right.

Accessories

HIM (Blank Plate)
20-HIM-A0
Cat Code: 0

LED Digital Speed
20-HIM-A1
Cat Code: 1

LCD Digital Speed
20-HIM-A2
Cat Code: 2



LCD Full Numeric
20-HIM-A3
Cat Code: 3

LCD Analog Speed
20-HIM-A4
Cat Code: 4

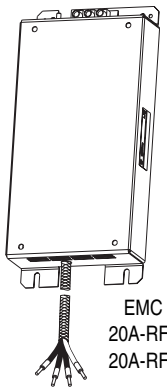
LCD Programmer Only
20-HIM-A5
Cat Code: 5

Remote (Panel Mount)
Full Numeric
20-HIM-C3

Remote (Panel Mount)
Programmer Only
20-HIM-C5

LCD NEMA 4X/12❷
Full Numeric
Cat Code: 3

Communication Adapter
20-COMM-D2



EMC Filter
20A-RF-08-A1
20A-RF-05-A3

Human Interface Modules (HIM) Option Kits

Handheld/Local (Drive Mount) Type❶❷	Catalog Number User Installed	Factory Installed (position 9)
Blank Plate	20-HIM-A0	0
LED Display, Digital Speed ❸	20-HIM-A1	1
LCD Display, Digital Speed	20-HIM-A2	2
LCD Display, Full Numeric Keypad	20-HIM-A3	3
LCD Display, Analog Speed Potentiometer	20-HIM-A4	4
LCD Display, Programmer Only	20-HIM-A5	5
Remote (Panel Mount) IP 66, UL Type 4x/12 ❹		
LCD Display, Full Numeric Keypad	20-HIM-C3 ❺	–
LCD Display, Programmer Only	20-HIM-C5 ❺	–

❶ Mounts to either IP20, NEMA Type 1 or Flange Type.
❷ Available only as factory installed for IP66, NEMA Type 4X/12 drives.
❸ LED HIM can not be used as a handheld device. It must be installed in the drive.
❹ For indoor use only.
❺ Includes a 1 meter PowerFlex HIM Interface Cable (20-HIM-H10).

Human Interface Module Interface Cables

Description	Catalog No.
PowerFlex HIM Interface Cable, 1 m (39 in.)❻	20-HIM-H10
Cable Kit (Male-Female) ❼	
0.33 Meters (1.1 Feet)	1202-H03
1 Meter (3.3 Feet)	1202-H10
3 Meter (9.8 Feet)	1202-H30
9 Meter (29.5 Feet)	1202-H90
DPI/SCANport™ One to Two Port Splitter Cable	1203-S03

❻ Required only when HIM is used as handheld or remotely mounted.
❼ Required in addition to 20-HIM-H10 for distances up to 10 Meters (32.8 Feet) maximum.

EMC Filters

Description	Frame	Catalog Number User Installed	Factory Installed (Position 13)
External 1-Phase 200-240V, 8A Filter	A	20A-RF-08-A1	N/A
External 3-Phase 200-480V, 5A Filter	A	20A-RF-05-A3	N/A
Internal 3-Phase 200-480 Filter❽	B, C, D	–	A

❽ Standard on Frames C and D. Optional on Frame B (Frame A ratings increase to Frame B).

Communication Options

Description	Catalog No. User Installed	Factory Installed (Position 14)
ControlNet Communication Adapter	20-COMM-C	C
DeviceNet Communication Adapter	20-COMM-D	D
EtherNet/IP Communication Adapter	20-COMM-E	E
RS485 HVAC Communication Adapter (Modbus RTU, Metasys N2, Siemens P1)	20-COMM-H	H
Remote I/O Communication Adapter	20-COMM-R	R
RS485 DF-1 Communication Adapter	20-COMM-S	S
Profibus Communication Adapter	20-COMM-P	N/A
Interbus Communication Adapter	20-COMM-I	N/A
LonWorks Communication Adapter	20-COMM-L	N/A
Smart Self-powered Serial Converter (RS-232) includes 1203-SFC and 1202-C10 Cables	1203-SSS	N/A
Serial Null Modem Adapter	1203-SNM	N/A

Accessories, Continued

Dynamic Brake Resistors

Application requirements should be thoroughly evaluated to determine what size (and thus type) will be sufficient. Publication PFLEX-AT001..., *Dynamic Braking Resistor Calculator*, provides a method based on application data such as load inertia.

Small Duty Internal DB Resistors

Limited duty resistors mount directly to the back surface of the drive and require no extra panel space. Internal resistors are non-destructive and do not require a resistor overheat external safety circuit.

PowerFlex 70 AC Drive			Small Duty Internal DB Resistor								
Normal Duty *kW (HP)*	Heavy Duty *kW (HP)*	Min DB Res *Ohms ±10%*	Part Number	Resistance *Ohms ±5%*	Continuos Power *kW*	Max Energy *kJ*	Max Braking Torque *% of ND Motor*	Application Type 1 Braking Torque *% of ND Motor*	Application Type 1 Duty Cycle	Application Type 2 Braking Torque *% of ND Motor*	Application Type 2 Duty Cycle
200-240 Volt AC Input Drives											
0.37 (0.5)	0.25 (0.33)	33	20AB-DB1-A	62	0.048	8.3	307%	100%	25.9%	150%	17.3%
0.75 (1)	0.55 (0.75)	33	20AB-DB1-A	62	0.048	7.3	300%	100%	12.8%	150%	8.5%
1.5 (2)	1.1 (1.5)	33	20AB-DB1-B	62	0.028	0.8	160%	100%	3.7%	150%	2.5%
2.2 (3)	1.5 (2)	33	20AB-DB1-B	62	0.028	0.8	109%	100%	2.5%	109%	2.3%
4 (5)	3 (3)	30	20AB-DB1-C	62	0.040	0.8	60%	60%	3.3%	N/A	N/A
5.5 (7.5)	4 (5)	23	20AB-DB1-D	22	0.036	0.9	117%	100%	1.3%	117%	1.1%
7.5 (10)	5.5 (7.5)	23	20AB-DB1-D	22	0.036	0.9	86%	86%	1.1%	N/A	N/A
400-480 Volt AC Input Drives											
0.37 (0.5)	0.25 (0.33)	68	20AD-DB1-A	115	0.048	8.3	320%	100%	25.9%	150%	17.3%
0.75 (1)	0.55 (0.75)	68	20AD-DB1-A	115	0.048	9.0	259%	100%	12.8%	150%	8.5%
1.5 (2)	1.1 (1.5)	68	20AD-DB1-A	115	0.048	2.4	243%	100%	6.4%	150%	4.3%
2.2 (3)	1.5 (2)	68	20AD-DB1-B	115	0.028	0.9	206%	100%	2.5%	150%	1.7%
4 (5)	3 (3)	68	20AD-DB1-B	115	0.028	0.9	129%	100%	1.4%	129%	1.1%
5.5 (7.5)	4 (5)	74	20AD-DB1-C	115	0.04	0.9	94%	94%	1.5%	N/A	N/A
7.5 (10)	5.5 (7.5)	74	20AD-DB1-C	115	0.04	0.9	69%	69%	1.5%	N/A	N/A
11 (15)	7.5 (10)	44	20AD-DB1-D	62	0.036	0.8	87%	87%	0.8%	N/A	N/A
15 (20)	11 (15)	31	20AD-DB1-D	62	0.036	0.8	64%	64%	0.8%	N/A	N/A
500-600 Volt AC Input Drives											
0.37 (0.5)	0.25 (0.33)	117	20AD-DB1-A	115	0.048	8.3	287%	100%	25.9%	150%	17.3%
0.75 (1)	0.55 (0.75)	117	20AD-DB1-A	115	0.048	9.0	263%	100%	12.8%	150%	8.5%
1.5 (2)	1.1 (1.5)	117	20AD-DB1-A	115	0.048	2.4	243%	100%	6.4%	150%	4.3%
2.2 (3)	1.5 (2)	117	20AD-DB1-B	115	0.028	0.9	202%	100%	2.5%	150%	1.7%
4 (5)	3 (3)	80	20AD-DB1-B	115	0.028	0.9	193%	100%	1.4%	150%	0.9%
5.5 (7.5)	4 (5)	80	20AD-DB1-C	115	0.04	0.9	147%	100%	1.5%	147%	1.0%
7.5 (10)	5.5 (7.5)	80	20AD-DB1-C	115	0.04	0.9	108%	100%	1.1%	108%	1.0%
11 (15)	7.5 (10)	48	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
15 (20)	11 (15)	48	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Medium Duty External DB Resistors

These resistors provide a larger duty cycle capability than the internal type. Includes an internal thermal switch for use in external safety circuit.

PowerFlex 70 AC Drive			Medium Duty External DB Resistor								
Normal Duty kW (HP)	Heavy Duty kW (HP)	Min DB Res Ohms ±10%	Part Number	Resistance Ohms ±5%	Continuos Power kW	Max Energy kJ	Max Braking Torque % of ND Motor	Application Type 1 Braking Torque % of ND Motor	Application Type 1 Duty Cycle	Application Type 2 Braking Torque % of ND Motor	Application Type 2 Duty Cycle
200-240 Volt AC Input Drives											
0.37 (0.5)	0.25 (0.33)	33	AK-R2-091P500	91	0.086	17	293%	100%	46%	150%	31%
0.75 (1)	0.55 (0.75)	33	AK-R2-091P500	91	0.086	17	218%	100%	23%	150%	15%
1.5 (2)	1.1 (1.5)	33	AK-R2-091P500	91	0.086	17	109%	100%	11%	109%	11%
2.2 (3)	1.5 (2)	33	AK-R2-047P500	47	0.166	33	144%	100%	15%	144%	11%
4 (5)	3 (3)	30	AK-R2-047P500	47	0.166	33	79%	79%	11%	N/A	N/A
5.5 (7.5)	4 (5)	23	AK-R2-030P1K2	30	0.26	52	90%	90%	10%	N/A	N/A
7.5 (10)	5.5 (7.5)	23	AK-R2-030P1K2	30	0.26	52	66%	66%	10%	N/A	N/A
400-480 Volt AC Input Drives											
0.37 (0.5)	0.25 (0.33)	68	AK-R2-360P500	360	0.086	17	305%	100%	47%	150%	31%
0.75 (1)	0.55 (0.75)	68	AK-R2-360P500	360	0.086	17	220%	100%	23%	150%	15%
1.5 (2)	1.1 (1.5)	68	AK-R2-360P500	360	0.086	17	110%	100%	12%	110%	11%
2.2 (3)	1.5 (2)	68	AK-R2-120P1K2	120	0.26	52	197%	100%	24%	150%	16%
4 (5)	3 (3)	68	AK-R2-120P1K2	120	0.26	52	124%	100%	13%	124%	10%
5.5 (7.5)	4 (5)	74	AK-R2-120P1K2	120	0.26	52	90%	90%	10%	N/A	N/A
7.5 (10)	5.5 (7.5)	74	AK-R2-120P1K2	120	0.26	52	66%	66%	10%	N/A	N/A
11 (15)	7.5 (10)	44	See Note 3	60	0.52	104	90%	90%	10%	N/A	N/A
15 (20)	11 (15)	31	See Note 3	60	0.52	104	66%	66%	10%	N/A	N/A
500-600 Volt AC Input Drives											
0.37 (0.5)	0.25 (0.33)	117	AK-R2-360P500	360	0.086	17	274%	100%	46%	150%	31%
0.75 (1)	0.55 (0.75)	117	AK-R2-360P500	360	0.086	17	251%	100%	23%	150%	15%
1.5 (2)	1.1 (1.5)	117	AK-R2-360P500	360	0.086	17	172%	100%	11%	150%	8%
2.2 (3)	1.5 (2)	117	AK-R2-120P1K2	120	0.26	52	193%	100%	24%	150%	16%
4 (5)	3 (3)	80	AK-R2-120P1K2	120	0.26	52	185%	100%	13%	150%	9%
5.5 (7.5)	4 (5)	80	AK-R2-120P1K2	120	0.26	52	141%	100%	9%	141%	7%
7.5 (10)	5.5 (7.5)	80	AK-R2-120P1K2	120	0.26	52	103%	100%	7%	103%	7%
11 (15)	7.5 (10)	48	See Note 3	60	0.52	104	141%	100%	9%	141%	7%
15 (20)	11 (15)	48	See Note 3	60	0.52	104	103%	100%	7%	103%	7%

Note 1: Always check resistor ohms against minimum resistance for drive being used.

Note 2: Duty cycle listed is based on full speed to zero speed deceleration.
For constant regen at full speed, duty cycle capability is half of what is listed.
Application Type 1 represents maximum capability up to 100% braking torque where possible.
Application Type 2 represents more than 100% braking torque where possible, up to a maximum of 150%.

Note 3: For 11 and 15 kW (15 and 20 HP) applications, use two 7.5 kW (10 HP) size resistors wired in parallel.

Accessories, Continued

Line Reactors

Drive Catalog Number		Rating		3% Impedance		5% Impedance	
		Normal	Heavy	IP 00 (Open Style)	IP 10 (NEMA Type 1)	IP 00 (Open Style)	IP 10 (NEMA Type 1)
Configured ❾	Standard	Duty	Duty	Catalog No.	Catalog No.	Catalog No.	Catalog No.
208V, 60 Hz, Three-Phase							
21AX2P2	20AB2P2	0.5 HP	0.33 HP	1321-3R2-D	1321-3RA2-D	1321-3R2-A	1321-3RA2-A
21AX4P2	20AB4P2	1 HP	0.75 HP	1321-3R4-A	1321-3RA4-A	1321-3R4-B	1321-3RA4-B
21AX6P8	20AB6P8	2 HP	1.5 HP	1321-3R8-A	1321-3RA8-A	1321-3R8-B	1321-3RA8-B
21AX9P6	20AB9P6	3 HP	2 HP	1321-3R12-A	1321-3RA12-A	1321-3R12-B	1321-3RA12-B
21AX015	20AB015	5 HP	3 HP	1321-3R18-A	1321-3RA18-A	1321-3R18-B	1321-3RA18-B
21AX022	20AB022	7.5 HP	5 HP	1321-3R25-A	1321-3RA25-A	1321-3R25-B	1321-3RA25-B
21AX028	20AB028	10 HP	7.5 HP	1321-3R35-A	1321-3RA35-A	1321-3R35-B	1321-3RA35-B
240V, 50/60 Hz, Three-Phase							
21AB2P2	20AB2P2	0.5 HP	0.33 HP	1321-3R2-D	1321-3RA2-D	1321-3R2-A	1321-3RA2-A
21AB4P2	20AB4P2	1 HP	0.75 HP	1321-3R4-A	1321-3RA4-A	1321-3R4-B	1321-3RA4-B
21AB6P8	20AB6P8	2 HP	1.5 HP	1321-3R8-A	1321-3RA8-A	1321-3R8-B	1321-3RA8-B
21AB9P6❸+❺	20AB9P6❸+❺	3 HP	2 HP	1321-3R12-A	1321-3RA12-A	1321-3R12-B	1321-3RA12-B
21AB9P6❹	20AB9P6❹	3 HP	2 HP	1321-3R8-A	1321-3RA8-A	1321-3R8-B	1321-3RA8-B
21AB015❸+❺	20AB015❸+❺	5 HP	3 HP	1321-3R18-A	1321-3RA18-A	1321-3R18-B	1321-3RA18-B
21AB015❹	20AB015❹	5 HP	3 HP	1321-3R12-A	1321-3RA12-A	1321-3R12-B	1321-3RA12-B
21AB022❸+❺	20AB022❸+❺	7.5 HP	5 HP	1321-3R25-A	1321-3RA25-A	1321-3R25-B	1321-3RA25-B
21AB022❹	20AB022❹	7.5 HP	5 HP	1321-3R18-A	1321-3RA18-A	1321-3R18-B	1321-3RA18-B
21AB028❸+❺	20AB028❸+❺	10 HP	7.5 HP	1321-3R35-A	1321-3RA35-A	1321-3R35-B	1321-3RA35-B
21AB028❹	20AB028❹	10 HP	7.5 HP	1321-3R25-A	1321-3RA25-A	1321-3R25-B	1321-3RA25-B
480V, 60 Hz, Three-Phase							
21AD1P1	20AD1P1	0.5 HP	0.33 HP	1321-3R2-B	1321-3RA2-B	1321-3R2-C	1321-3RA2-C
21AD2P1❸+❺	20AD2P1❸+❺	1 HP	0.75 HP	1321-3R2-A	1321-3RA2-A	1321-3R2-B	1321-3RA2-B
21AD2P1❹	20AD2P1❹	1 HP	0.75 HP	1321-3R2-B	1321-3RA2-B	1321-3R2-C	1321-3RA2-C
21AD3P4	20AD3P4	2 HP	1.5 HP	1321-3R4-B	1321-3RA4-B	1321-3R4-C	1321-3RA4-C
21AD5P0❶+❹	20AD5P0❶+❹	3 HP	2 HP	1321-3R4-B	1321-3RA4-B	1321-3R4-C	1321-3RA4-C
21AD5P0❷+❺	20AD5P0❷+❺	3 HP	2 HP	1321-3R8-B	1321-3RA8-B	1321-3R8-C	1321-3RA8-C
21AD8P0❸+❺	20AD8P0❸+❺	5 HP	3 HP	1321-3R8-B	1321-3RA8-B	1321-3R8-C	1321-3RA8-C
21AD8P0❹	20AD8P0❹	5 HP	3 HP	1321-3R4-B	1321-3RA4-B	1321-3R4-C	1321-3RA4-C
21AD011❸+❺	20AD011❸+❺	7.5 HP	5 HP	1321-3R12-B	1321-3RA12-B	1321-3R12-C	1321-3RA12-C
21AD011❹	20AD011❹	7.5 HP	5 HP	1321-3R8-B	1321-3RA8-B	1321-3R8-C	1321-3RA8-C
21AD014❸+❺	20AD014❸+❺	10 HP	7.5 HP	1321-3R18-B	1321-3RA18-B	1321-3R18-C	1321-3RA18-C
21AD014❹	20AD014❹	10 HP	7.5 HP	1321-3R12-B	1321-3RA12-B	1321-3R12-C	1321-3RA12-C
21AD022❸+❺	20AD022❸+❺	15 HP	10 HP	1321-3R25-B	1321-3RA25-B	1321-3R25-C	1321-3RA25-C
21AD022❹	20AD022❹	15 HP	10 HP	1321-3R18-B	1321-3RA18-B	1321-3R18-C	1321-3RA18-C
21AD027❸+❺	20AD027❸+❺	20 HP	15 HP	1321-3R35-B	1321-3RA35-B	1321-3R35-C	1321-3RA35-C
21AD027❹	20AD027❹	20 HP	15 HP	1321-3R25-B	1321-3RA25-B	1321-3R25-C	1321-3RA25-C
600V, 60 Hz, Three-Phase							
20AE0P9❶+❷	–	0.5 HP	0.33 HP	1321-3R1-C	1321-3RA1-C	1321-3R1-B	1321-3RA1-B
20AE0P9❹+❺	–	0.5 HP	0.33 HP	1321-3R1-B	1321-3RA1-B	1321-3R1-A	1321-3RA1-A
20AE1P7❼	–	1 HP	0.75 HP	1321-3R2-B	1321-3RA2-B	1321-3R2-C	1321-3RA2-C
20AE2P7❸+❹	–	2 HP	1.5 HP	1321-3R2-A	1321-3RA2-A	1321-3R2-B	1321-3RA2-B
20AE2P7❺	–	2 HP	1.5 HP	1321-3R2-B	1321-3RA2-B	1321-3R2-C	1321-3RA2-C
20AE3P9❶+❻	–	3 HP	2 HP	1321-3R4-C	1321-3RA4-C	1321-3R4-D	1321-3RA4-D
20AE3P9❷	–	3 HP	2 HP	1321-3R4-B	1321-3RA4-B	1321-3R4-C	1321-3RA4-C
20AE6P1❽	–	5 HP	3 HP	1321-3R8-C	1321-3RA8-C	1321-3R8-D	1321-3RA8-D
20AE6P1❺	–	5	3 HP	1321-3R4-B	1321-3RA4-B	1321-3R4-C	1321-3RA4-C
20AE9P0❶+❷	–	7.5 HP	5 HP	1321-3R8-B	1321-3RA8-B	1321-3R8-C	1321-3RA8-C
20AE9P0❹+❺	–	7.5 HP	5 HP	1321-3R8-C	1321-3RA8-C	1321-3R8-D	1321-3RA8-D
20AE011❶+❷	–	10 HP	7.5 HP	1321-3R12-B	1321-3RA12-B	1321-3R12-C	1321-3RA12-C
20AE011❹+❺	–	10 HP	7.5 HP	1321-3R8-B	1321-3RA8-B	1321-3R8-C	1321-3R8-C
20AE017❶+❷	–	15 HP	10 HP	1321-3R18-B	1321-3RA18-B	1321-3R18-C	1321-3RA18-C
20AE017❹+❺	–	15 HP	10 HP	1321-3R12-B	1321-3RA12-B	1321-3R12-C	1321-3RA12-C
20AE022❶+❷	–	20 HP	15 HP	1321-3R25-B	1321-3RA25-B	1321-3R25-C	1321-3RA25-C
20AE022❹+❺	–	20 HP	15 HP	1321-3R18-B	1321-3RA18-B	1321-3R18-C	1321-3RA18-C

❶ Normal Duty Input.
❷ Normal Duty Output.
❸ Normal Duty Input/Output.
❹ Heavy Duty Input.
❺ Heavy Duty Output.
❻ Heavy Duty Input/Output.
❼ Heavy Duty Output Impedance is 2% vs. 3% and 3.1% vs. 5%.
❽ Normal Duty Input/Output and Heavy Duty Input. Heavy Duty Input Impedance is 2.12% vs. 3% and 3.2% vs. 5%.
❾ Line reactor catalog offering reflects product mounted outside the Configured Drive package. See page 11 for options related to integrating a line reactor. Input line reactors were sized based on the NEC fundamental motor amps. Output line reactors were sized based on the VFD rated output currents.

Standard Packaged Drives

PowerFlex 70 Standard Packaged AC drives are ideal for global OEMs and end-users with special installation needs. Designed to meet your customer demands for space savings, application flexibility and reliability, the cost-effective PowerFlex 70 Standard Packaged AC drive program provides options that have been pre-engineered to ensure superior reliability.

Standard Packaged Drives offer three levels of PowerFlex 70 product: Quick Ship, Pre-engineered, and Custom/OEM Specific programs.

Quick Ship Program

- 480V top of frame NEMA Type 1 or NEMA Type 4/12 packages
- Pre-determined catalog numbers
- Delivery within 1 to 3 business days of order entry
- Additional select options with delivery within 5 business days of order entry

Standard Features

- Four different 480V PowerFlex 70 flange mount drives [21AQD]
- NEMA Type 1 (IP 20) [-AA] or NEMA Type 4/12 (IP 65) indoor enclosure [-AF]
- Full Numeric LCD HIM, door mounted [-C3]
- Circuit Breaker [-CB] or Fuse Disconnect [-DS]
- 115V AC Control Power Transformer [-CF]
- Hand/Off/Auto Selector Switch [-D1A]
- Drive Run Pilot Light [-D2A]
- Drive Fault Pilot Light [-D2B]
- Control Power On Pilot Light [-D3A]
- Drive Fault Control Relay [-JF]
- Drive Run Control Relay [-JR]

Quick Ship Catalog Numbers For Order Entry

Frame	Normal Duty HP	Heavy Duty HP	Type In Quick Ship Catalog Number	Actual Standard Name Plated Catalog Number	Dimensions (Inches)
IP20, NEMA Type 1					
A	2	1.5	21AQD3P4-AA-DS	21AQD3P4-AA-DS-C3-CF-D1A-D2A-D2B-D3A-JF-JR	32h x 24w x 16d
B	5	3	21AQD8P0-AA-DS	21AQD8P0-AA-DS-C3-CF-D1A-D2A-D2B-D3A-JF-JR	32h x 24w x 16d
C	10	7.5	21AQD014-AA-DS	21AQD014-AA-DS-C3-CF-D1A-D2A-D2B-D3A-JF-JR	32h x 24w x 16d
D	20	15	21AQD027-AA-DS	21AQD027-AA-DS-C3-CF-D1A-D2A-D2B-D3A-JF-JR	38h x 24w x 16d
A	2	1.5	21AQD3P4-AA-CB	21AQD3P4-AA-CB-C3-CF-D1A-D2A-D2B-D3A-JF-JR	32h x 24w x 16d
B	5	3	21AQD8P0-AA-CB	21AQD8P0-AA-CB-C3-CF-D1A-D2A-D2B-D3A-JF-JR	32h x 24w x 16d
C	10	7.5	21AQD014-AA-CB	21AQD014-AA-CB-C3-CF-D1A-D2A-D2B-D3A-JF-JR	32h x 24w x 16d
D	20	15	21AQD027-AA-CB	21AQD027-AA-CB-C3-CF-D1A-D2A-D2B-D3A-JF-JR	38h x 24w x 16d
IP65, NEMA Type 4/12					
A	2	1.5	21AQD3P4-AF-DS	21AQD3P4-AF-DS-C3-CF-D1A-D2A-D2B-D3A-JF-JR	32h x 24w x 16d
B	5	3	21AQD8P0-AF-DS	21AQD8P0-AF-DS-C3-CF-D1A-D2A-D2B-D3A-JF-JR	32h x 24w x 16d
C	10	7.5	21AQD014-AF-DS	21AQD014-AF-DS-C3-CF-D1A-D2A-D2B-D3A-JF-JR	32h x 24w x 16d
D	20	15	21AQD027-AF-DS	21AQD027-AF-DS-C3-CF-D1A-D2A-D2B-D3A-JF-JR	38h x 24w x 16d
A	2	1.5	21AQD3P4-AF-CB	21AQD3P4-AF-CB-C3-CF-D1A-D2A-D2B-D3A-JF-JR	32h x 24w x 16d
B	5	3	21AQD8P0-AF-CB	21AQD8P0-AF-CB-C3-CF-D1A-D2A-D2B-D3A-JF-JR	32h x 24w x 16d
C	10	7.5	21AQD014-AF-CB	21AQD014-AF-CB-C3-CF-D1A-D2A-D2B-D3A-JF-JR	32h x 24w x 16d
D	20	15	21AQD027-AF-CB	21AQD027-AF-CB-C3-CF-D1A-D2A-D2B-D3A-JF-JR	38h x 24w x 16d

Additional Options ❶❷❸

- Drive Mounted Brake [-BR]
- Drive Mounted ControlNet™ Comm Module [-GC]
- Drive Mounted DeviceNet™ Comm Module [-GD]
- Drive Mounted Profibus Comm Module [-GP]
- Drive Mounted RIO Comm Module [-GR]
- Panel Mounted Analog Input Isolator, 0-10V [-N1]
- Panel Mounted Analog Input Isolator, 4-20mA [-N2]
- Panel Mounted Analog Output Isolator, 0-10V [-N3]

❶ Catalog numbers with additional options use bulletin number 21A.

❷ Additional options increase lead-time from 3 to 5 business days.

❸ Orders requiring select options should be entered as follows: **21A**D3P4-AF-**BR**-C3-CB-CF-D1A-D2A-D3A-JF-JR-**N1** (Not **21AQD**3P4-AF-**BR**-CB-**N1**)

Standard Packaged Drives

Pre-Engineered Program

NEMA Type 1
- Panel Mount Drive
- Modular Construction
- 240V/480V/600V Ratings

NEMA Type 4/12 Indoor
- Flange Mount Drive
- Welded Construction
- 240V/480V/600V Ratings

NEMA Type 3/4 Outdoor
- Flange Mount Drive
- Welded Construction
- 240V/480V/600V Ratings

All Enclosure Types
- Drive Input Protection Options
- Input/Output Contactors
- Bypass Options
- Input/Output Line Reactor Options
- 115V Control Power Options
- Control Interface and Feedback Options
- Human Interface Modules
- Motor Interface Options
- Operator Devices
- Drawing and Test Options

Description and Approximate Dimensions

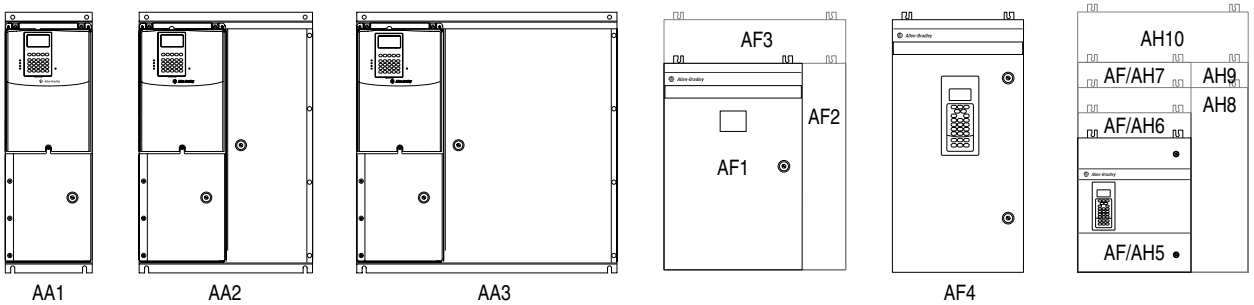
Enclosure Rating	Code	Style	Dimensions *millimeters (inches)* Height	Width	Depth	Description
NEMA Type 1 IP 20	AA1	1	667.8 (26.3)	220.7 (8.7)	293.1 (11.5)	Panel mount drive with drive input protection option.
	AA2	2	667.8 (26.3)	441.5 (17.4)	293.1 (11.5)	Panel mount drive with program options less line/load reactors.
	AA3	3	667.8 (26.3)	662.2 (26.1)	293.1 (11.5)	Panel mount drive with all program options.
NEMA Type 4/12 Indoor NEMA Type 3/4 Outdoor IP 65	AF	1	457.2 (18.0)	304.8 (12.0)	304.8 (12.0)	A and B frame flange mount drive with drive mounted options only.
	AF	2	457.2 (18.0)	406.4 (16.0)	304.8 (12.0)	C frame flange mount drive with drive mounted options only.
	AF	3	558.8 (22.0)	406.4 (16.0)	304.8 (12.0)	D frame flange mount drive with drive mounted options only.
	AF/AH	4	812.8 (32.0)	330.2 (13.0)	304.8 (12.0)	A-D frame flange mount drive with input protection option.
	AF/AH	5	812.8 (32.0)	609.6 (24.0)	406.4 (16.0)	Flange mount drives. Size varies with drive frame and option selection.
	AF/AH	6	965.2 (38.0)	609.6 (24.0)	406.4 (16.0)	
	AF/AH	7	1270.0 (50.0)	609.6 (24.0)	406.4 (16.0)	
	AH	8	1117.6 (44.0)	914.4 (36.0)	406.4 (16.0)	
	AH	9	1270.0 (50.0)	914.4 (36.0)	406.4 (16.0)	
	AH	10	1574.8 (62.0)	914.4 (36.0)	406.4 (16.0)	

See product Price List, publication 20A-PL001 for further detail.

Custom/OEM Specific Package Program

- Meets customer-specific specifications
- All voltage ratings are available

The Allen-Bradley Standard Packaged Drives Program allows users to order Standard Packaged PowerFlex 70 drives that exceed the options offered with a standard drive product. Users can choose from an options list that includes control, power, packaging and documentation to meet unique application demands. The program provides different physical pre-engineered package sizes based upon environmental and option mounting requirements.



Installation Considerations

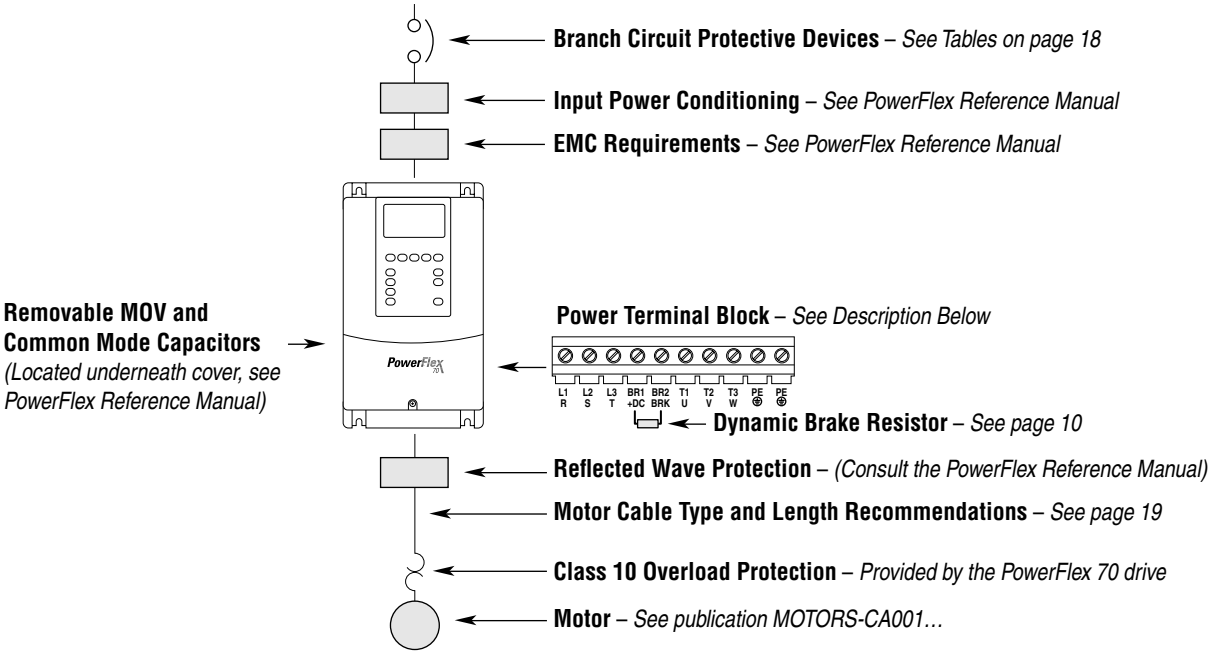
Power Wiring

The PowerFlex 70 has the following built in protective features to help simplify installation:

- Ground fault protection during start-up and running helps ensure reliability
- Electronic motor moverload protection increases motor life
- Removable MOV to ground and common mode capacitors to ground, ensures compatibility with ungrounded systems
- 6kV transient protection increased robustness for 380-480V system voltages

There are many other factors that must be considered for optimal performance in any given application. The block diagram below highlights the primary installation considerations. Consult the *PowerFlex Reference Manual*, Publication PFLEX-RM001…, available on-line at www.ab.com/manuals/dr, for detailed recommendations on input power conditioning, CE conformance (EMC filtering), dynamic braking, reflected wave protection, motor cables types and motor cable distances.

Block Diagram


Branch Circuit Protective Devices – See Tables on page 18
Input Power Conditioning – See PowerFlex Reference Manual
EMC Requirements – See PowerFlex Reference Manual
Removable MOV and Common Mode Capacitors (Located underneath cover, see PowerFlex Reference Manual)
Power Terminal Block – See Description Below
L1 R
L2 S
L3 T
BR1 +DC
BR2 BRK
T1 U
T2 V
T3 W
PE
PE
Dynamic Brake Resistor – See page 10
Reflected Wave Protection – (Consult the PowerFlex Reference Manual)
Motor Cable Type and Length Recommendations – See page 19
Class 10 Overload Protection – Provided by the PowerFlex 70 drive
Motor – See publication MOTORS-CA001…

Power Terminal Block

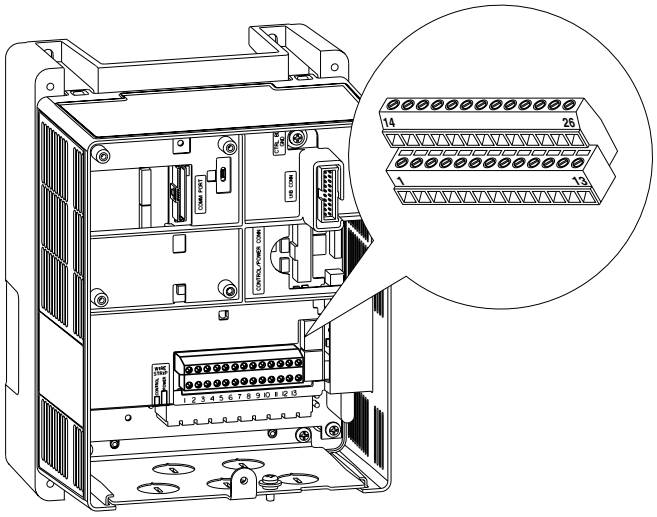
Terminal	Description	Notes
R	R (L1)	AC Line Input Power
S	S (L2)	AC Line Input Power
T	T (L3)	AC Line Input Power
BR1/+DC	DC Bus (+)	Dynamic Brake Resistor Connection (+)
BR2/BRK	DC Brake	Dynamic Brake Resistor Connection (–)
U	U (T1)	To Motor
V	V (T2)	To Motor
W	W (T3)	To Motor
PE	PE Ground	
PE	PE Ground	

Power Wiring

		Wire Size Range ❶		Torque	
Name	Frame	Maximum	Minimum	Maximum	Recommended
Power Terminal Block	A, B, & C	3.3 mm^2 (12 AWG)	0.8 mm^2 (18 AWG)	0.66 N-m (5.5 lb.-in.)	0.6 N-m (5 lb.-in.)
SHLD terminal	D	5.3 mm^2 (10 AWG)	1.3 mm^2 (16 AWG)	1.7 N-m (15 lb.-in.)	1.4 N-m (12 lb.-in.)
SHLD terminal	All	—	—	1.6 N-m (14 lb.-in.)	1.6 N-m (14 lb.-in.)

❶ Maximum/minimum sizes that the terminal block will accept - these are not recommendations.

Control Wiring



No.	Signal	Factory Default	Description	Related Param.
1	Digital In1 Sel	Stop – CF (CF = Clear Fault)	11.2 mA @ 24V DC 19.2V minimum on state 3.2V maximum off state Important: Use only 24V DC, not suitable for 115V AC circuitry. Inputs can be wired as sink or source.	361 - 366
2	Digital In2 Sel	Start		
3	Digital In3 Sel	Auto/Man		
4	Digital In4 Sel	Speed Sel 1		
5	Digital In5 Sel	Speed Sel 2		
6	Digital In6 Sel	Speed Sel 3		
7	24V Common	–	Drive supplied power for Digital In1-6 inputs. 150mA maximum load.	
8	Digital In Common	–		
9	+24V DC	–		
10	+10V Pot Reference	–	2 k ohm minimum load.	
11	Digital Out 1 – N.O. ❶	NOT Fault	Max Resistive Load: 250V AC / 30V DC, 50 VA / 60 Watts Max Inductive Load: 250V AC / 30V DC, 25 VA / 30 Watts Minimum DC Load: 10 µA, 10 mV DC	380 - 387
12	Digital Out 1 Common			
13	Digital Out 1 – N.C. ❶	Fault		
14	Analog In 1 (– Volts)	Voltage – Reads value at 14 & 15 ❷	Non-isolated, 0 to +10V, 10 bit, 100k ohm input impedance. ❸	320 - 327
15	Analog In 1 (+ Volts)			
16	Analog In 1 (– Current)		Non-isolated, 4-20mA, 10 bit, 100 ohm input impedance. ❸	
17	Analog In 1 (+ Current)			
18	Analog In 2 (– Volts)	Voltage – Reads value at 18 & 19 ❷	Isolated, bipolar, differential, 0 to +10V unipolar (10 bit) or ±10V bipolar (10 bit & sign), 100k ohm input impedance.❹	
19	Analog In 2 (+ Volts)			
20	Analog In 2 (– Current)		Isolated, 4-20mA, 10 bit & sign, 100 ohm input impedance. ❹	
21	Analog In 2 (+ Current)			
22	Analog Out (– Volts) 10V Pot Common	Output Freq ❷	0 to +10V, 10 bit, 10k ohm (2k ohm minimum) load. Referenced to chassis ground. Common if internal 10V supply (terminal 10) is used.	341 - 344
23	Analog Out (+ Volts)			
24	Digital Out 2 – N.O.	Run	See description at No.s 11-13.	380 - 387
25	Digital Out 2 Common			
26	Digital Out 2 – N.C.			

❶ Contacts shown in unpowered state. Relays change state when drive is powered.

❷ These inputs/outputs are dependent on a number of parameters. See "Related Parameters."

❸ Differential Isolation - External source must be less than 10V with respect to PE.

❹ Differential Isolation - External source must be maintained at less than 160V with respect to PE. Input provides high common mode immunity.

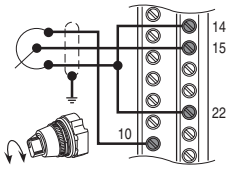
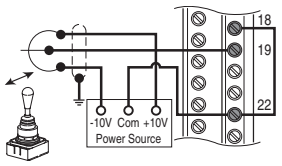
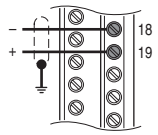
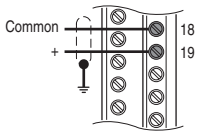
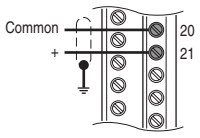
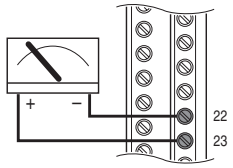
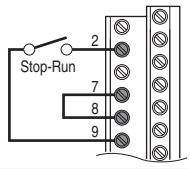
Control Wiring, Continued

I/O Wiring

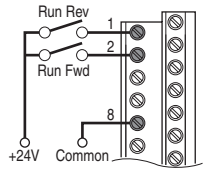
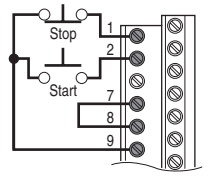
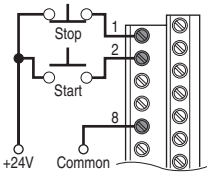
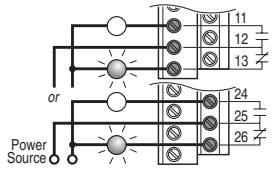
	Wire Size Range ❶		Torque	
Name	**Maximum**	**Minimum**	**Maximum**	**Recommended**
I/O Terminal Block	1.5 mm² (16 AWG)	0.05 mm² (30 AWG)	0.55 N-m (4.9 lb.-in.)	0.5 N-m (4.4 lb.-in.)

❶ Maximum/minimum sizes that the terminal block will accept - these are not recommendations.

I/O Wiring Examples

Input/Output	Connection Example	Required Parameter Settings
Potentiometer Unipolar Speed Reference 10k Ohm Pot. Recommended (2k Ohm minimum)		Select Speed Reference source: Param. 090 = 1 “Analog In 1” Adjust Scaling: Param. 091, 092, 322, 323 Check Results: Param. 016
Joystick Bipolar Speed Reference ±10V Input		Set Direction Mode: Param. 190 = 1 “Bipolar” Adjust Scaling: Param. 091, 092, 325, 326 Check Results: Param. 017
Analog Input Bipolar Speed Reference ±10V Input		Adjust Scaling: Param. 091, 092, 325, 326 Check Results: Param. 017
Analog Input Unipolar Speed Reference 0 to +10V Input		Adjust Scaling: Param. 091, 092, 325, 326 Check Results: Param. 017
Analog Input Unipolar Speed Reference 4-20 mA Input		Configure Input for Current: Param. 320, Bit #1 = 1 “Current” Adjust Scaling: Param. 091, 092, 325, 326 Check Results: Param. 017
Analog Output Unipolar 0 to +10V Output. Can Drive a 2k Ohm load (25 mA short circuit limit)		Select Source Value: Param. 342 Adjust Scaling: Param. 343, 344
2 Wire Control Non-Reversing	Internal Supply 	Disable Digital Input 1: Param. 361 = 0 “Not Used” Set Digital Input 2: Param. 362 = 7 “Run”

Control Wiring, Continued

Input/Output	Connection Example	Required Parameter Settings
2 Wire Control Reversing	External Supply 	Set Digital Input 1: Param. 361 = 8 “Run Forward” Set Digital Input 2: Param. 362 = 9 “Run Reverse”
3 Wire Control	Internal Supply 	Use factory default parameter settings.
3 Wire Control	External Supply 	Use factory default parameter settings.
Digital Output Form C Relays Energized in Normal State.		Select Source: Param. 380, 384

Specifications

Branch Circuit Protection Devices and Power Dissipation

Drive Catalog Number	Frame❾	HP Rating		Input Ratings		Output Amps			Input Branch Circuit Protection Devices								Power Dissipation ❽	
									Dual Element Time Delay Fuse		Non-Time Delay Fuse		❸ Circuit Breaker	❹ Motor Circuit Protector	140M Motor Starter with Adjustable Current Range ❺ ❻					
		ND	HD	Amps	kVA	Cont.	1 Min.	3 Sec.	❶ Min.	❷ Max.	❶ Min.	❷ Max.	Amps	Amps	Available Catalog Numbers ❼				Internal	Total
208 Volt AC Input																				
20AB2P2	A	0.5	0.33	2.9	1.1	2.5	2.7	3.7	6	6	6	10	15	7	140M-C2E-B40	140M-D8E-B40	–	–	19.2	31.4
20AB4P2	A	1	0.75	5.6	2	4.8	5.5	7.4	10	10	10	17.5	15	7	140M-C2E-B63	140M-D8E-B63	–	–	20.5	51.2
20AB6P8	B	2	1.5	10	3.6	7.8	10.3	13.8	15	15	15	30	30	15	140M-C2E-C10	140M-D8E-C10	140M-F8E-C10	–	22.6	67.2
20AB9P6	B	3	2	14	5.1	11	12.1	16.5	20	25	20	40	40	30	140M-C2E-C16	140M-D8E-C16	140M-F8E-C16	–	25.4	92.7
20AB015	C	5	3	16	5.8	17.5	19.2	26.6	20	35	20	70	70	30	140M-C2E-C20	140M-D8E-C20	140M-F8E-C20	–	33.2	174.5
20AB022	D	7.5	5	23.3	8.3	25.3	27.8	37.9	30	50	30	100	100	30	140M-C2E-C25	140M-D8E-C25	140M-F8E-C25	140M-CMN-2500	34.2	239.9
20AB028	D	10	7.5	29.8	10.7	32.2	37.9	50.6	40	70	40	125	125	50	–	–	140M-F8E-C32	140M-CMN-4000	48.1	318.5
240 Volt AC Input																				
20AB2P2	A	0.5	0.33	2.5	1.1	2.2	2.4	3.3	3	4.5	3	8	15	3	140M-C2E-B25	140M-D8E-B25	–	–	19.2	31.4
20AB4P2	A	1	0.75	4.8	2	4.2	4.8	6.4	6	9	6	15	15	7	140M-C2E-B63	140M-D8E-B63	–	–	20.5	51.2
20AB6P8	B	2	1.5	8.7	3.6	6.8	9	12	15	15	15	25	25	15	140M-C2E-C10	140M-D8E-C10	140M-F8E-C10	–	22.6	67.2
20AB9P6	B	3	2	12.2	5.1	9.6	10.6	14.4	20	20	20	35	35	15	140M-C2E-C16	140M-D8E-C16	140M-F8E-C16	–	25.4	92.7
20AB015	C	5	3	13.9	5.8	15.3	17.4	23.2	20	30	20	60	60	30	140M-C2E-C16	140M-D8E-C16	140M-F8E-C16	–	33.2	174.5
20AB022	D	7.5	5	19.9	8.3	22	24.4	33	25	45	25	80	80	30	140M-C2E-C20	140M-D8E-C20	140M-F8E-C20	–	34.2	239.9
20AB028	D	10	7.5	25.7	10.7	28	33	44	35	60	35	110	110	50	–	–	140M-F8E-C32	140M-CMN-4000	48.1	318.5
400 Volt AC Input																				
20AC1P3	A	0.37	0.25	1.6	1.1	1.3	1.4	1.9	3	3	3	5	15	3	140M-C2E-B16	–	–	–	17.9	29.4
20AC2P1	A	0.75	0.55	2.5	1.8	2.1	2.4	3.2	4	6	4	8	15	7	140M-C2E-B25	140M-D8E-B25	–	–	19.5	47.3
20AC3P5	A	1.5	1.1	4.3	3	3.5	4.5	6	6	6	6	12	15	7	140M-C2E-B40	140M-D8E-B40	–	–	21.6	65.2
20AC5P0	B	2.2	1.5	6.5	4.5	5	5.5	7.5	10	10	10	20	20	15	140M-C2E-C10	140M-D8E-C10	140M-F8E-C10	–	24.0	88.6
20AC8P7	B	4	3	11.3	7.8	8.7	9.9	13.2	15	17.5	15	30	30	15	140M-C2E-C16	140M-D8E-C16	140M-F8E-C16	–	28.2	127.7
20AC011	C	5.5	4	11	7.6	11.5	13	17.4	15	25	15	45	40	15	140M-C2E-C16	140M-D8E-C16	140M-F8E-C16	–	27.8	167.8
20AC015	C	7.5	5.5	15.1	10.4	15.4	17.2	23.1	20	30	20	60	60	20	140M-C2E-C16	140M-D8E-C16	140M-F8E-C16	–	32.0	225.3
20AC022	D	11	7.5	21.9	15.2	22	24.2	33	30	45	30	80	80	30	140M-C2E-C25	140M-D8E-C25	140M-F8E-C25	140-CMN-2500	34.2	339.6
20AC030	D	15	11	30.3	21	30	33	45	40	60	40	120	120	50	–	–	140M-F8E-C32	140M-CMN-4000	42.9	475.8
480 Volt AC Input																				
20AD1P1	A	0.5	0.33	1.3	1.1	1.1	1.2	1.6	3	3	3	4	15	3	140M-C2E-B16	–	–	–	17.9	29.4
20AD2P1	A	1	0.75	2.4	2	2.1	2.4	3.2	3	6	3	8	15	3	140M-C2E-B25	140M-D8E-B25	–	–	19.5	47.3
20AD3P4	A	2	1.5	3.8	3.2	3.4	4.5	6	6	6	6	12	15	7	140M-C2E-B40	140M-D8E-B40	–	–	21.6	65.2
20AD5P0	B	3	2	5.6	4.7	5	5.5	7.5	10	10	10	20	20	15	140M-C2E-C63	140M-D8E-C63	–	–	24.0	88.6
20AD8P0	B	5	3	9.8	8.4	8	8.8	12	15	15	15	30	30	15	140M-C2E-C10	140M-D8E-C10	140M-F8E-C10	–	28.2	127.7
20AD011	C	7.5	5	9.5	7.9	11	12.1	16.5	15	20	15	40	40	15	140M-C2E-C16	140M-D8E-C16	140M-F8E-C16	–	27.8	167.8
20AD015	C	10	7.5	12.5	10.4	14	16.5	22	20	30	20	50	50	20	140M-C2E-C16	140M-D8E-C16	140M-F8E-C16	–	32.0	225.3
20AD022	D	15	10	19.9	16.6	22	24.2	33	25	45	25	80	80	30	140M-C2E-C20	140M-D8E-C20	140M-F8E-C20	–	34.2	339.6
20AD027	D	20	15	24.8	20.6	27	33	44	35	60	35	100	100	50	–	–	140M-F8E-C25	140M-CMN-2500	42.9	475.8
600 Volt AC Input																				
20AE0P9	A	0.5	0.33	1.3	1.3	0.9	1.1	1.4	3	3	3	3.5	15	3	140M-C2E-B16	–	–	–	17.9	29.4
20AE1P7	A	1	0.75	1.9	2	1.7	2	2.6	3	6	3	6	15	3	140M-C2E-B25	140M-D8E-B25	–	–	19.5	47.3
20AE2P7	A	2	1.5	3	3.1	2.7	3.6	4.8	4	6	4	10	15	7	140M-C2E-B40	140M-D8E-B40	–	–	21.6	65.2
20AE3P9	B	3	2	4.4	4.5	3.9	4.3	5.9	6	8	6	15	15	7	140M-C2E-C63	140M-D8E-C63	–	–	24.0	88.6
20AE6P1	B	5	3	7.5	7.8	6.1	6.7	9.2	10	12	10	20	20	15	140M-C2E-C10	140M-D8E-C10	140M-F8E-C10	–	28.2	127.7
20AE9P0	C	7.5	5	7.7	8	9	9.9	13.5	10	20	10	35	35	15	140M-C2E-C10	140M-D8E-C10	140M-F8E-C10	–	27.8	167.8
20AE011	C	10	7.5	9.8	10.1	11	13.5	18	15	20	15	40	40	15	140M-C2E-C16	140M-D8E-C16	140M-F8E-C16	–	32.0	225.3
20AE017	D	15	10	15.3	15.9	17	18.7	25.5	20	35	20	60	60	30	140M-C2E-C20	140M-D8E-C20	140M-F8E-C20	–	34.2	339.6
20AE022	D	20	15	20	20.8	22	25.5	34	25	45	25	80	80	30	140M-C2E-C25	140M-D8E-C25	140M-F8E-C25	140M-CMN-2500	42.9	475.8

❶ Minimum protection device size is the lowest rated device that supplies maximum protection without nuisance tripping.

❷ Maximum protection device size is the highest rated device that supplies drive protection.

❸ Circuit breaker - inverse time breaker.

❹ Motor Circuit Protector - instantaneous trip circuit breaker.

❺ Bulletin 140M with adjustable current range should have the current trip set to the minimum range that the device will not trip.

❻ Manual Self-Protector (Type E) Combination Motor Controller, UL Listed for 208 Wye, 240 Wye or Delta, 480Y/277 or 600y/347. Not UL listed for use on 480V or 600V Delta/Delta Systems.

❼ The AIC ratings of the Bulletin 140M Motor Protector may vary without testing. See Publication 140M-SG001B-EN-P.

❽ At 4kHz PWM frequency. See *PowerFlex Reference Manual* for derating above 4kHz.

❾ For internally filtered drives, Frame A increases to Frame B. For enclosure Code C (IP66, NEMA 4X/12), Frame A increases to Frame B and Frame C increases to Frame D.

Maximum Lead Lengths (in feet)

480V HP Rating	Carrier Freq. (kHz)	1000 Volt Motor			1200 Volt Motor			1488 Volt Motor NEMA MG1-1998			1600 Volt Motor 1329 R/L		
		Shld. ❶	Shld. ❷	Un-Shld.	Shld. ❶	Shld. ❷	Un-Shld.	Shld. ❶	Shld. ❷	Un-Shld.	Shld. ❶	Shld. ❷	Un-Shld.
0.5	2	NA	60	40	NA	175	60	NA	175	150	NA	175	150
	4	NA	60	40	NA	175	60	NA	175	130	NA	175	150
	6	NA	60	40	NA	175	50	NA	175	130	NA	175	150
	8	NA	60	40	NA	175	50	NA	175	130	NA	175	150
	10	NA	60	40	NA	175	50	NA	175	130	NA	175	150
1	2	NA	70	30	NA	275	55	NA	275	180	NA	275	350
	4	NA	70	30	NA	250	55	NA	250	180	NA	250	300
	6	NA	70	30	NA	250	55	NA	250	170	NA	250	280
	8	NA	70	30	NA	250	55	NA	250	160	NA	250	260
	10	NA	70	30	NA	200	55	NA	250	160	NA	250	240
2	2	NA	70	40	NA	275	75	NA	275	500	NA	275	500
	4	NA	70	40	NA	250	75	NA	250	400	NA	250	400
	6	NA	70	40	NA	250	75	NA	250	360	NA	250	400
	8	NA	70	40	NA	240	75	NA	250	260	NA	250	400
	10	NA	70	40	NA	220	75	NA	250	260	NA	250	400
3	2	NA	70	40	NA	220	75	NA	425	600	NA	425	600
	4	NA	70	40	NA	220	75	NA	400	520	NA	400	600
	6	NA	70	40	NA	220	75	NA	425	520	NA	425	600
	8	NA	70	40	NA	220	75	NA	400	380	NA	400	580
	10	NA	70	40	NA	220	75	NA	400	380	NA	400	550
5	2	NA	80	40	NA	280	80	NA	450	600	NA	450	600
	4	NA	80	40	NA	280	80	NA	400	600	NA	400	600
	6	NA	80	40	NA	280	80	NA	400	560	NA	400	600
	8	NA	80	40	NA	280	80	NA	300	400	NA	300	600
	10	NA	80	40	NA	280	80	NA	300	360	NA	300	580
7.5	2	NA	50	40	NA	300	60	NA	400	600	NA	400	600
	4	NA	50	40	NA	300	60	NA	400	600	NA	400	600
	6	NA	50	40	NA	300	60	NA	400	520	NA	400	600
	8	NA	50	40	NA	300	60	NA	400	400	NA	400	560
	10	NA	50	40	NA	300	60	NA	300	320	NA	300	500
10	2	NA	50	40	NA	300	60	NA	400	600	NA	400	600
	4	NA	50	40	NA	300	60	NA	400	600	NA	400	600
	6	NA	50	40	NA	300	60	NA	400	560	NA	400	600
	8	NA	50	40	NA	300	60	NA	400	440	NA	400	560
	10	NA	50	40	NA	300	60	NA	300	380	NA	300	520
15	2	NA	80	50	NA	600	80	NA	600	600	NA	600	600
	4	NA	80	50	NA	400	80	NA	600	600	NA	600	600
	6	NA	80	50	NA	400	80	NA	600	600	NA	600	600
	8	NA	80	50	NA	400	80	NA	600	500	NA	600	600
	10	NA	80	50	NA	400	80	NA	600	400	NA	600	480
20	2	NA	70	50	NA	600	80	NA	600	600	NA	600	600
	4	NA	70	50	NA	400	80	NA	600	600	NA	600	600
	6	NA	70	50	NA	200	80	NA	600	600	NA	600	600
	8	NA	70	50	NA	160	80	NA	600	600	NA	600	600
	10	NA	70	50	NA	160	80	NA	600	340	NA	600	600

❶ Cable is Belden 295xx series or equivalent.

❷ Cable is Alcatel C1202 or equivalent. Shielded cable with twisted conductors and no filler.

Notes

– 1000V motor is defined as one assembled without phase paper. 1200V motor is defined as one assembled with phase paper. 1488V motor meets NEMA MG 1-1998 section 31 standard where the insulation can withstand voltage spikes of 3.1 x rated motor voltage due to inverter operation (inverter duty motor). 1600V motor is a 1329R or 1329L. Operation at nominal line voltage. To increase the distance between the drive and the motor, some mitigation device needs to be added to the system (i.e. an RWR or Terminator).

– Shading indicates limited due to cable charging current.

– NA = Data Not Available at time of publication.

Specifications

Control and Performance

Category	Specification						
Protection	PowerFlex 70 Drive	200-208V Drive	240V Drive	380/400 Drive	480V Drive	600V Drive	
	AC Input Overvoltage Trip:	247V AC	285V AC	475V AC	570V AC	690V AC	
	AC Input Undervoltage Trip:	120V AC	138V AC	233V AC	280V AC	345V AC	
	Bus Overvoltage Trip:	350V DC	405V DC	675V DC	810V DC	1013V DC	
	Bus Undervoltage Trip:	176V DC	204V DC	339V DC	407V DC	998V DC	
	Nominal Bus Voltage:	281V DC	324V DC	540V DC	648V DC	810V DC	
	All Drives						
	Heat Sink Thermistor:	Monitored by microprocessor overtemp trip					
	Drive Overcurrent Trip Software Current Limit: Hardware Current Limit: Instantaneous Current Limit:	 20-160% of rated current 200% of rated current (typical) 220-300% of rated current (dependent on drive rating)					
	Line transients:	up to 6000 volts peak per IEEE C62.41-1991					
	Control Logic Noise Immunity:	Showering arc transients up to 1500V peak					
	Power Ride-Thru:	15 milliseconds at full load					
	Logic Control Ride-Thru:	0.5 seconds minimum, 2 seconds typical					
	Ground Fault Trip:	Phase-to-ground on drive output					
	Short Circuit Trip:	Phase-to-phase on drive output					
Environment	Altitude:	1000 m (3300 ft) max. without derating					
	Ambient Operating Temperature without derating: IP20, NEMA Type 1 IP66, NEMA Type 4X/12 Flange Type	 0 to 50 degrees C (32 to 122 degrees F) 0 to 40 degrees C (32 to 104 degrees F) 0 to 50 degrees C (32 to 122 degrees F)					
	Storage Temperature (all const.):	–40 to 70 degrees C (–40 to 158 degrees F)					
	Atmosphere	**Important:** Drive **must not** be installed in an area where the ambient atmosphere contains volatile or corrosive gas, vapors or dust. If the drive is not going to be installed for a period of time, it must be stored in an area where it will not be exposed to a corrosive atmosphere.					
	Relative Humidity:	5 to 95% non-condensing					
	Shock:	15G peak for 11ms duration (±1.0 ms)					
	Vibration:	0.152 mm (0.006 in.) displacement, 1G peak					
Agency Certification	**Type 1, IP30**	**Flange Type**	**Type 4X/ 12, IP66**				
	✔	✔	✔	c UL us	Listed to UL508C and CAN/CSA-C2.2 No. 14-M91		
		✔			Listed to UL508C for plenums (Rear heatsink only)		
		✔		CE	Marked for all applicable European Directives ❶ EMC Directive (89/336/EEC) EN 61800-3 Adjustable Speed electrical power drive systems Low Voltage Directive (73/23/EEC) EN 50178 Electronic Equipment for use in Power Installations		
	✔	✔	✔	N223	Certified to AS/NZS, 1997 Group 1, Class A		
	✔	✔	✔	NSF	Certified to Criteria C-2, 1983.		
	The drive is also designed to meet the appropriate portions of the following specifications: NFPA 70 - US National Electrical Code NEMA ICS 3.1 - Safety standards for Construction and Guide for Selection, Installation and Operation of Adjustable Speed Drive Systems. IEC 146 - International Electrical Code.						
Electrical	Voltage Tolerance:	–10% of minimum, +10% of maximum. See the PowerFlex *User Manual*, publication 20A-UM001…, for Full Power and Operating Range.					
	Frequency Tolerance:	47-63 Hz.					
	Input Phases:	Three-phase input provides full rating for all drives. Single-phase operation provides 50% of rated current.					
	Displacement Power Factor All Drives:	 0.98 across entire speed range.					
	Efficiency:	97.5% at rated amps, nominal line volts.					
	Max. Short Circuit Current Rating: Using Recommended Fuse or Circuit Breaker Type	Maximum short circuit current rating to match specified fuse/circuit breaker capability.					

Control and Performance, Continued

Category	Specification	
Control	Method:	Sine coded PWM with programmable carrier frequency.
	Carrier Frequency PF70 - A-D Frame Drives:	 2-10 kHz. Drive rating based on 4 kHz
	Output Voltage Range:	0 to rated motor voltage
	Output Frequency Range:	0 to 400 Hz.
	Frequency Accuracy Digital Input: Analog Input:	 Within ±0.01% of set output frequency. Within ±0.4% of maximum output frequency.
	Speed Regulation - Open Loop with Slip Compensation:	±0.5% of base speed across a 40:1 speed range.
	Selectable Motor Control:	Sensorless Vector with full tuning. Standard V/Hz with full custom capability. PF700 adds flux vector.
	Stop Modes:	Multiple programmable stop modes including - Ramp, Coast, DC-Brake, Ramp-to-Hold and S-curve.
	Accel/Decel:	Two independently programmable accel and decel times. Each time may be programmed from 0 - 3600 seconds in 0.1 second increments
	Intermittent Overload:	110% Overload capability for up to 1 minute 150% Overload capability for up to 3 seconds
	Current Limit Capability:	Proactive Current Limit programmable from 20 to 160% of rated output current. Independently programmable proportional and integral gain.
	Electronic Motor Overload Protection	Class 10 protection with speed sensitive response. Investigated by U.L. to comply with N.E.C. Article 430. U.L. File E59272, volume 12.

❶ Applied noise impulses may be counted in addition to the standard pulse train causing erroneously high (pulse frequency) readings.

Parameter List

Parameter Name	Number	Default Value
Output Freq	001	Read Only
Commanded Freq	002	Read Only
Output Current	003	Read Only
Torque Current	004	Read Only
Flux Current	005	Read Only
Output Voltage	006	Read Only
Output Power	007	Read Only
Output Powr Fctr	008	Read Only
Elapsed MWh	009	Read Only
Elapsed Run Time	010	Read Only
MOP Frequency	011	Read Only
DC Bus Voltage	012	Read Only
DC Bus Memory	013	Read Only
Analog In1, 2 Value	016, 017	Read Only
Rated kW	026	Read Only
Rated Volts	027	Read Only
Rated Amps	028	Read Only
Control SW Ver	029	Read Only
Motor Type	040	0 “Induction”
Motor NP Volts	041	Based on Drive Rating
Motor NP FLA	042	Based on Drive Rating
Motor NP Hertz	043	Based on Drive Cat. No.
Motor NP RPM	044	1750 RPM
Motor NP Power	045	Based on Drive Rating
Mtr NP Pwr Units	046	Based on Drive Rating
Motor OL Hertz	047	Motor NP Hz/3
Motor OL Factor	048	1.00
Torque Perf Mode	053	0 “Sensrls Vect”
Maximum Voltage	054	Drive Rated Volts
Maximum Freq	055	110.0 or 130.0 Hz
Compensation	056	1 “Enabled”
Flux Up Mode	057	0 “Manual”
Flux Up Time	058	0.00 Secs
Autotune	061	3 “Calculate”
IR Voltage Drop	062	Based on Drive Rating
Flux Current Ref	063	Based on Drive Rating
Start/Acc Boost	069	Based on Drive Rating
Run Boost	070	Based on Drive Rating
Break Voltage	071	[Motor NP Volts] × 0.25
Break Frequency]	072	[Motor NP Freq] × 0.25
Speed Mode	080	0 “Open Loop”
Minimum Speed	081	0.0 Hz
Maximum Speed	082	50.0 or 60.0 Hz
Overspeed Limit	083	10.0 Hz
Skip Frequency 1-3	084-086	0.0 Hz
Skip Freq Band	087	0.0 Hz
Speed Ref A Sel	090	2 “Analog In 2”
Speed Ref A Hi	091	[Maximum Speed]
Speed Ref A Lo	092	0.0 Hz

Parameter Name	Number	Default Value
Speed Ref B Sel	093	11 “Preset Spd1”
Speed Ref B Hi	094	[Maximum Speed]
Speed Ref B Lo	095	0.0 Hz
TB Man Ref Sel	096	1 “Analog In 1”
TB Man Ref Hi	097	[Maximum Speed]
TB Man Ref Lo	098	0.0 Hz
Jog Speed	100	10.0 Hz
Preset Speed 1-7	101-107	5.0 - 60.0 Hz
Trim In Select	117	2 “Analog In 2”
Trim Out Select	118	0 “Not Trimmed”
Trim Hi	119	60.0 Hz
Trim Lo	120	0.0 Hz
Slip RPM @ FLA	121	Based on [Motor NP RPM]
Slip Comp Gain	122	40.0
Slip RPM Meter	123	Read Only
PI Configuration	124	0 “Disabled”
PI Control	125	0 “Disabled”
PI Reference Sel	126	0 “PI Setpoint”
PI Setpoint	127	50.00%
PI Feedback Sel	128	2 “Analog In 2”
PI Integral Time	129	2.00 Secs
PI Prop Gain	130	1.00
PI Lower Limit	131	–[Maximum Freq]
PI Upper Limit	132	+[Maximum Freq]
PI Preload	133	0.0 Hz
PI Status	134	Read Only
PI Ref Meter	135	Read Only
PI Fdback Meter	136	Read Only
PI Error Meter	137	Read Only
PI Output Meter	138	Read Only
Accel Time 1, 2	140, 141	10.0 Secs
Decel Time 1, 2	142, 143	10.0 Secs
S Curve%	146	0%
Current Lmt Sel	147	0 “Cur Lim Val”
Current Lmt Val	148	[Rated Amps] × 1.5
Current Lmt Gain	149	250
Drive OL Mode	150	3 “Both–PWM 1st”
PWM Frequency	151	4 kHz
Stop Mode A	155	1 “Ramp”
Stop Mode B	156	0 “Coast”
DC Brake Lvl Sel	157	0 “DC Brake Lvl”
DC Brake Level	158	[Rated Amps]
DC Brake Time	159	0.0 Secs
Bus Reg Gain	160	450
Bus Reg Mode A	161	1 “Adjust Freq”
Bus Reg Mode B	162	4 “Both-Frq 1st”
DB Resistor Type	163	0 “Internal Res”
Start At PowerUp	168	0 “Disabled”
Flying Start En	169	0 “Disabled”
Flying StartGain	170	4000

Parameter List, Continued

Parameter Name	Number	Default Value
Auto Rstrt Tries	174	0
Auto Rstrt Delay	175	1.0 Secs
Power Loss Mode	184	0 “Coast”
Power Loss Time	185	0.5 Secs
Direction Mode	190	0 “Unipolar”
Save HIM Ref	192	1 “Save at Power Down”
Man Ref Preload	193	0 “Disabled”
Save MOP Ref	194	0 “Do Not Save”
MOP Rate	195	1.0 Hz/s
Param Access Lvl	196	0 “Basic”
Reset To Defalts	197	0 “Ready”
Load Frm Usr Set	198	0 “Ready”
Save To User Set	199	0 “Ready”
Reset Meters	200	0 “Ready”
Language	201	0 “Not Selected”
Voltage Class	202	Based on Drive Cat. No.
Drive Checksum	203	Read Only
Drive Status 1, 2	209, 210	Read Only
Drive Alarm 1, 2	211, 212	Read Only
Speed Ref Source	213	Read Only
Start Inhibits	214	Read Only
Last Stop Source	215	Read Only
Dig In Status	216	Read Only
Dig Out Status	217	Read Only
Drive Temp	218	Read Only
Drive OL Count	219	Read Only
Motor OL Count	220	Read Only
Fault Frequency	224	Read Only
Fault Amps	225	Read Only
Fault Bus Volts	226	Read Only
Status 1, 2 @ Fault	227	Read Only
Alarm 1, 2 @ Fault	228	Read Only
Testpoint 1, 2 Sel	229, 230	Read Only
Fault Config 1	238	0 “Disabled”
Fault Clear	240	0 “Ready”
Fault Clear Mode	241	1 “Enabled”
Power Up Marker	242	Read Only
Fault 1-4 Code	242-249	Read Only
Fault 1-4 Time	244-250	Read Only
Alarm Config 1	259	1 “Enabled”
DPI Data Rate	270	0 “125 kbps”
Drive Logic Rslt	271	Read Only
Drive Ref Rslt	272	Read Only
Drive Ramp Rslt	273	Read Only
Logic Mask	276	1 “Control Permitted”
Start Mask	277	1 “Control Permitted”
Jog Mask	278	1 “Control Permitted”
Direction Mask	279	1 “Control Permitted”
Reference Mask	280	1 “Control Permitted”
Accel Mask	281	1 “Control Permitted”

Parameter Name	Number	Default Value
Decel Mask	282	1 “Control Permitted”
Fault Clr Mask	283	1 “Control Permitted”
MOP Mask	284	1 “Control Permitted”
Local Mask	285	1 “Control Permitted”
Stop Owner	288	Read Only
Start Owner	289	Read Only
Jog Owner	290	Read Only
Direction Owner	291	Read Only
Reference Owner	292	Read Only
Accel Owner	293	Read Only
Decel Owner	294	Read Only
Fault Clr Owner	295	Read Only
MOP Owner	296	Read Only
Local Owner	297	Read Only
Data In A1	300	0 (0 = “Disabled”)
Data In A2	301	0 (0 = “Disabled”)
Data In B1	302	0 (0 = “Disabled”)
Data In B2	303	0 (0 = “Disabled”)
Data In C1	304	0 (0 = “Disabled”)
Data In C2	305	0 (0 = “Disabled”)
Data In D1	306	0 (0 = “Disabled”)
Data In D2	307	0 (0 = “Disabled”)
Data Out A1	310	0 (0 = “Disabled”)
Data Out A2	311	0 (0 = “Disabled”)
Data Out B1	312	0 (0 = “Disabled”)
Data Out B2	313	0 (0 = “Disabled”)
Data Out C1	314	0 (0 = “Disabled”)
Data Out C2	315	0 (0 = “Disabled”)
Data Out D1	316	0 (0 = “Disabled”)
Data Out D2	317	0 (0 = “Disabled”)
Anlg In Config	320	0 “Voltage”
Anlg In Sqr Root	321	0 “Disable”
Analog In 1, 2 Hi	322, 325	10.000 Volt
Analog In 1, 2 Lo	323, 326	0.000 Volt
Anlg In 1, 2 Loss	324, 327	0 “Disabled”
Anlg Out Absolut	341	1 “Absolute”
Analog Out1 Sel	342	0 “Output Freq”
Analog Out1 Hi	343	10.00 Volt
Analog Out1 Lo	344	0.00 Volt
Digital In1 Sel	361	4 “Stop – CF”
Digital In2 Sel	362	5 “Start”
Digital In3 Sel	363	18 “Auto/ Manual”
Digital In4 Sel	364	15 “Speed Sel 1”
Digital In5 Sel	365	16 “Speed Sel 2”
Digital In6 Sel	366	17 “Speed Sel 3”
Digital Out1 Sel	380	1 “Fault”
Digital Out2 Sel	384	4 “Run”
Dig Out1, 2 Level	381, 385	0.0
Dig Out1, 2 OnTime	382, 386	0.00 Secs
Dig Out1, 2 OffTime	383, 387	0.00 Secs

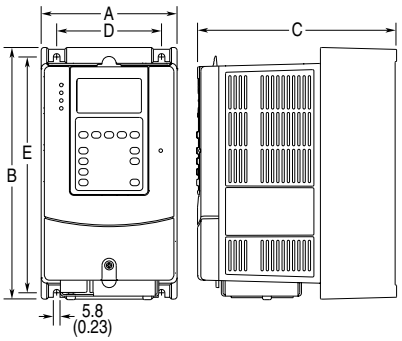
Approximate Dimensions – PowerFlex 70 Drives

Rating/Frame Size Cross-Reference

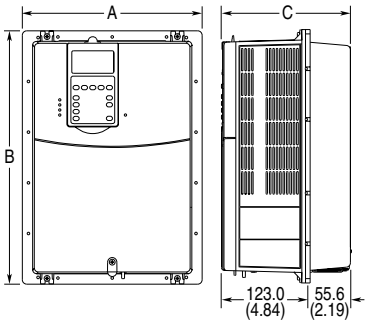
Output Power		Frame Size								
		200-240V			400-480V			500-600V		
kW ND (HD)	HP ND (HD)	Without Internal Filter	With Internal Filter	IP66, NEMA Type 4X/12	Without Internal Filter	With Internal Filter	IP66, NEMA Type 4X/12	Without Internal Filter	With Internal Filter	IP66, NEMA Type 4X/12
0.37 (0.25)	0.5 (0.33)	A	B	B	A	B	B	A	–	B
0.75 (0.55)	1 (0.75)	A	B	B	A	B	B	A	–	B
1.5 (1.1)	2 (1.5)	B	B	B	A	B	B	A	–	B
2.2 (1.5)	3 (2)	B	B	B	B	B	B	B	–	B
4 (3)	5 (3)	–	C	D	B	B	B	B	–	B
5.5 (4)	7.5 (5)	–	D	D	–	C	D	C	–	D
7.5 (5.5)	10 (7.5)	–	D	D	–	C	D	C	–	D
11 (7.5)	15 (10)	–	–	–	–	D	D	D	–	D
15 (11)	20 (15)	–	–	–	–	D	D	D	–	D

PowerFlex 70 Frames A-D

IP20/66, NEMA Type 1/4X/12



Flange Mount



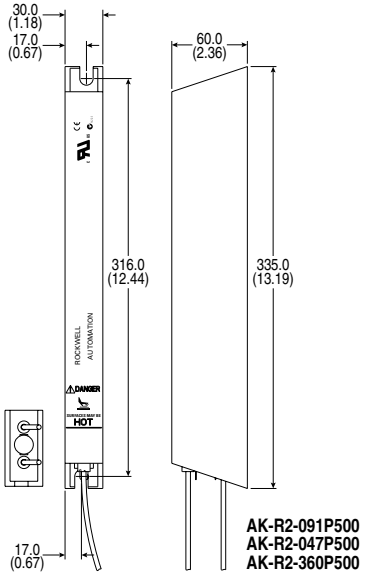
Dimensions are in millimeters and (inches).

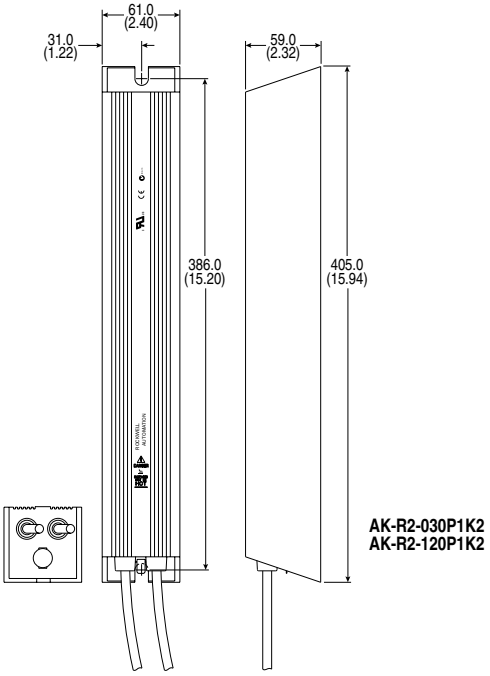
Frame	A	B	C	D	E	Drive Weight ❶ *kg (lbs.)*
IP20, NEMA Type 1						
A	122.4 (4.82)	225.7 (8.89)	179.8 (7.08)	94.2 (3.71)	211.6 (8.33)	2.71 (6.0)
B	171.7 (6.76)	234.6 (9.24)	179.8 (7.08)	122.7 (4.83)	220.2 (8.67)	3.60 (7.9)
C	185.0 (7.28)	300.0 (11.81)	179.8 (7.08)	137.6 (5.42)	285.6 (11.25)	6.89 (15.2)
D	219.9 (8.66)	350.0 (13.78)	179.8 (7.08)	169.0 (6.65)	335.6 (13.21)	9.00 (19.8)
IP66, NEMA Type 4X/12						
B	171.7 (6.76)	239.8 (9.44)	203.3 (8.00)	122.7 (4.83)	220.2 (8.67)	3.61 (8.0)
D	219.9 (8.66)	350.0 (13.78)	210.7 (8.29)	169.0 (6.65)	335.6 (13.21)	9.13 (20.1)
Flange Mount						
A	156.0 (6.14)	225.8 (8.89)	178.6 (7.03)	–	–	2.71 (6.0)
B	205.2 (8.08)	234.6 (9.24)	178.6 (7.03)	–	–	3.60 (7.9)
C	219.0 (8.62)	300.0 (11.81)	178.6 (7.03)	–	–	6.89 (15.2)
D	248.4 (9.78)	350.0 (13.78)	178.6 (7.03)	–	–	9.00 (19.8)

❶ Weights include HIM and Standard I/O.

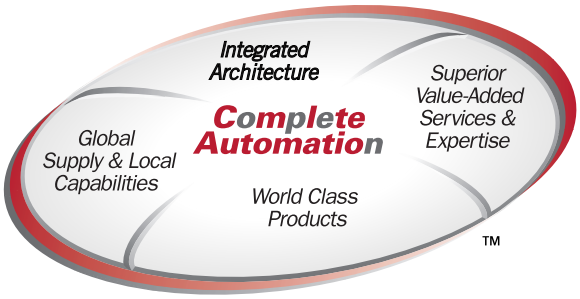
Approximate Dimensions – Medium Duty External Dynamic Brake Resistors

Dimensions are in millimeters and (inches).





Catalog Number	Ohms	Watts	Frame Size
AK-R2-091P500	91	86	A
AK-R2-047P500	47	166	A
AK-R2-360P500	360	86	A
AK-R2-030P1K2	30	260	B
AK-R2-120P1K2	120	260	B



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Rockwell Automation is committed to helping its customers meet ever-changing demands. PowerFlex drives illustrate our commitment to user productivity through timely delivery of world-class products and continued backward compatibility to minimize life-cycle costs. Count on Rockwell Automation to be your Complete Automation™ partner – now and in the future.

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